

NAVORD-1488(V.4)

NAVORD REPORT 1488 (Vol. 4)

HANDBOOK OF
SUPersonic
AERODYNAMICS

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NAVORD REPORT 1488 (Vol 4)

CHANGE 1

To all holders of NAVORD REPORT 1488 (Vol 4)
insert change; write on cover 'Change 1 inserted'
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WTP/Johnstone Pages _____ Page 1

ASSISTANT DIRECTOR, RESEARCH AND DEVELOPMENT DIVISION

NAVORD REPORT 1488 (Vol 4)

HANDBOOK OF SUPERSONIC AERODYNAMICS

is changed as follows:

1. Insert this Change Sheet in the front of Volume 4.

2. On the pages indicated, make the following changes:

✓ (a) Page 1201-5, Paragraph (c), Line 1

Insert the Greek letter Ω between "of" and "that".

✓ (b) Page 1201-6, Paragraph (1), Line 3

Change the last word to "flutter".

(c) Page 1204.1-2, Line 8

Insert the bar over the right-hand side of the equation so as to make the equation read:

$$\xi = \overline{(C_1^2 - 4 C_2)}$$

✓ (d) Page 1204.11-1, Paragraph (a), Line 2

Insert the Greek Letter Ω between "parameter" and "and".

✓ (e) Page 1204.11-2, Paragraph 2, Line 2

Change 0.7 to 2.0.

(f) Page 1204.11-2, Paragraph 3, Line 4, Eq. 1204.11-4

✓ In the equation for $C_{L\alpha}$ change the second minus sign (-) to a plus sign (+), so as to read $C_{L\alpha} = -132.93679 + i 6.776163$.

✓ (g) Page 1204.11-3, Equations 1204.11-9

In the equation for $4 C_2$ change 8.4258 to 8.4260.

✓ In the equations for $C_1^2 - 4 C_2$ and for ξ change 1.0735 to 1.0734.

✓ In the equation for θ , change $-29^\circ 2.74'$ to $-29^\circ 2.9'$.

(h) Page 1204.11-4, Paragraph 3, first sentence

Change this sentence to read "Similar computations of ω_α^b/a (the reduced natural frequency k_α), and of g , have been completed for sixteen values of Ω , ranging from 0.2 to 2.0, and all of these values have been plotted (g vs k_α) in Figure 1204.11-1 for Mach number 1.4."

(i) Page 1204.11-5 (Figure 1204.11-1)

✓ Change " g_α " to "g" in the ordinate designation; and add as legend in lower right-hand corner of grid:

$$\begin{aligned} g_\lambda &= g_\alpha \equiv g \\ m/\pi pb^2 &= 100.0 \\ I_\alpha'/\pi pb^4 &= 16.67 \\ \omega_h/\omega_\alpha &= 0.700 \\ r &= 0 \\ x_\alpha &= 0 \end{aligned}$$

(j) Page 1206-2, Equation 1206-4

✓ In the equation for A_{31} , change the exponent in the third term from 4 to 3 so as to make this equation read:

$$A_{31} = C_{Lh} \left(\frac{1}{2} + c \right) - C_{Mh} - \left(\frac{1+c}{2} \right)^3 \left(\frac{3}{2} C''_{Lh} - C''_{Mh} \right)$$

✓ In the equation for A_{32} , change the coefficients of the last two terms in the bracketed [] expression from $C''_{L\alpha}$ to C''_{Mh} and from C''_{Lh} to $C''_{L\alpha}$ respectively, so as to make the bracketed expression read:

$$\left[-C''_{M\alpha} - \frac{3}{2} C''_{Lh} \left(2 \frac{r+1}{c+1} - \frac{1}{2} \right) + C''_{Mh} \left(2 \frac{r+1}{c+1} - \frac{1}{2} \right) + \frac{3}{2} C''_{L\alpha} \right]$$

NAVORD REPORT 1488 (Vol. 4)

HANDBOOK OF SUPERSONIC AERODYNAMICS



Compiled and edited under Bureau of Ordnance Contract NOrd 7386 by the Aerodynamics Handbook Staff of The Johns Hopkins University, Applied Physics Laboratory, Silver Spring, Maryland. The selection and technical editing of the material appearing in the Handbook are functions of a Reviewing Committee appointed by the Director of the Laboratory. The membership of this Committee is presently as follows: C. N. Warfield (Chairman), L. L. Cronvich, A. R. Eaton, Jr., G. M. Edelman, and F. K. Hill.

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HANDBOOK OF SUPERSONIC AERODYNAMICSVolume 4Preface

A general preface to the entire Handbook of Supersonic Aerodynamics appears in Volume 1; therefore, the present preface applies specifically to the present issue of this portion of Volume 4 only.

This volume, when completed, will contain the following sections: Section 9 - Mutual Interference Phenomena, Section 10 - Static Stability, Section 11 - Dynamic Stability, and Section 12 - Aeroelastic Phenomena. Section 12 only is being issued at this time; the remaining sections for Volume 4 will be issued when completed.

Since the publication of Volumes 1 and 2 the contents of future volumes in the Handbook Series has been changed in accordance with the outline set forth on page iii of this preface under the caption: "Contents of Future Volumes in the Handbook of Supersonic Aerodynamics Series."

The numbering system for Volume 4 is the same as that used in Volume 2.

Agencies and individuals interested in the aeronautical sciences should feel free to submit and recommend material for inclusion in the Handbook; full credit will be given for all such material used. In the selection of material and the preparation of the volumes in the Handbook Series, the Applied Physics Laboratory lays claim neither to omniscience nor to infallibility; therefore, it earnestly solicits constructive criticisms and suggestions. Correspondence relating to the editing of the Handbook Series should be sent to

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ABBREVIATED TABLE OF CONTENTS
FOR PUBLISHED SECTIONS (arranged by volumes) OF THE
HANDBOOK OF SUPERSONIC AERODYNAMICS SERIES

VOLUME 1* (NAVORD REPORT 1488, Unclassified)

Section 1 - Symbols and Nomenclature
Section 2 - Fundamental Equations and Formulae
Section 3 - General Atmospheric Data
Section 4 - The Mechanics and Thermodynamics of
Steady One-Dimensional Gas Flow

VOLUME 2* (NAVORD REPORT 1488, Unclassified)

Section 5 - Compressible Flow Tables and Graphs

VOLUME 4* (NAVORD REPORT 1488, Unclassified)

Section 12 - Aeroelastic Phenomena

* Volumes 1, 2, and 4 may be obtained by addressing the Superintendent of Documents,
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Volume 2 (Section 5) (NAVORD REPORT 1488).....	\$1.50 per copy
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CONTENTS OF FUTURE VOLUMES IN THE
HANDBOOK OF SUPERSONIC AERODYNAMICS SERIES

VOLUME 3

- Section 6 - Two-Dimensional Airfoils
- Section 7 - Three-Dimensional Airfoils
- Section 8 - Solid and Ducted Bodies

VOLUME 4

- Section 9 - Mutual Interference Phenomena
- Section 10 - Static Stability
- Section 11 - Dynamic Stability
- Section 12* - Aeroelastic Phenomena

VOLUME 5

- Section 13 - Viscosity Effects
- Section 14 - Heat Transfer
- Section 15 - Properties of Gases
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- Section 17 - Ducts, Nozzles and Diffusers
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- Section 21 - Miscellaneous Problems

* Published herewith.

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Stability Boundaries for Single-Degree-of-Freedom Torsional
Flutter for Zero Damping ($g_\alpha = 0$)

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r = -0.6	1201-5d
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SECTION 12 - AEROELASTIC PHENOMENA

The following symbols are used in the material appearing on pages 1200-1 to 1208.2-58 of Section 12:

Primary Symbols

a	velocity of sound (free stream), ft/sec
b	semi-chord length, ft
c	location of aileron hinge line measured from mid-chord point in fractions of the semi-chord (+ aft)
C_h	translational spring constant per unit span, (lbs/ft) / (ft span)
C_1, C_2, C_3	coefficients of determinantal equation
C_{Lh}	part of supersonic flutter aerodynamic force coefficient due to vertical displacement of the wing quarter-chord axis only
$C_{L\alpha}$	part of supersonic flutter aerodynamic force coefficient due to rotational motion only
C_{Mh}	part of supersonic flutter aerodynamic moment coefficient due to vertical displacement of the wing quarter-chord axis only
$C_{M\alpha}$	part of supersonic flutter aerodynamic moment coefficient due to rotational motion only
C'_{Lh}	C_{Lh} when using the reduced frequency of the aileron
$C'_{L\alpha}$	$C_{L\alpha}$ when using the reduced frequency of the aileron
C'_{Mh}	C_{Mh} when using the reduced frequency of the aileron
$C'_{M\alpha}$	$C_{M\alpha}$ when using the reduced frequency of the aileron
C''_{Lh}	C_{Lh} when using the reduced frequency of the wing forward of the aileron
$C''_{L\alpha}$	$C_{L\alpha}$ when using the reduced frequency of the wing forward of the aileron
C''_{Mh}	C_{Mh} when using the reduced frequency of the wing forward of the aileron
$C''_{M\alpha}$	$C_{M\alpha}$ when using the reduced frequency of the wing forward of the aileron
C_α	torsional spring constant per unit span, (ft-lbs/rad)/(ft span)

C_β	torsional spring constant per unit span for aileron (ft-lbs/rad)/(ft span)
d	distance of elastic axis aft of quarter-chord line, ft
E	Young's modulus of elasticity
E_e	elastic energy
E_k	kinetic energy
F	half the rate of energy dissipation
g_h	structural translational damping factor
g_α	structural torsional damping factor
g_β	structural torsional damping factor for aileron
G	shear modulus of elasticity
h	displacement of wing quarter-chord axis from the neutral position (+ downward), ft; also a general- ized displacement
h'	displacement of wing elastic axis from the neutral position (+ downward), ft
h_o	amplitude of h; also generalized amplitude of dis- placement
h'_o	amplitude of h'
i	complex operator, $\sqrt{-1}$
I	section moment of inertia, ft^4
I'_α	moment of inertia of system about elastic axis per unit span, $lb\cdot ft\cdot sec^2/(ft \text{ span})$
I_β	moment of inertia of aileron about hinge line per unit span, $lb\cdot ft\cdot sec^2/(ft \text{ span})$
J	effective section polar moment of inertia, ft^4
k	reduced frequency, $\omega b/v$, non-dimensional $[= \Omega (M^2 - 1) / 2M^2]$
k_α	reduced natural frequency in torsion, $\omega_\alpha b/a$
l	semi-span, ft
L	aerodynamic force per unit span, assumed at quarter- chord (+ downward, negative lift) #

The symbol L for aerodynamic force, as used in this section of the Handbook, for either primary or secondary concepts, is in the opposite direction to that of lift as customarily used in aerodynamics and as defined in Section 1 of this Handbook.

L_g	generalized aerodynamic force
L_h	part of aerodynamic force per unit span (L), assumed at quarter-chord point, due to various time derivatives of vertical displacement (h) of the wing quarter-chord axis
L_α	part of aerodynamic force per unit span (L), assumed at quarter-chord point, due to rotational displacement of the wing
L_β	aerodynamic force due to aileron per unit span
m	mass of moving system per unit span
m_1	mass of wing per unit span ($m_1 = m$ in most applications)
m_β	mass of aileron per unit span
M	Mach number (free stream), V/a ; also moment per unit span (+ nose up)
M_g	generalized aerodynamic moment per unit span about elastic axis
M_h	part of aerodynamic moment per unit span (M) about the quarter-chord axis, due to vertical displacement (h) of the wing
M_α	part of aerodynamic moment per unit span (M) about the quarter-chord axis, due to rotational displacement of the wing
M_β	aerodynamic moment about hinge line due to the aileron
M'	aerodynamic moment per unit span, about the elastic axis
N	mechanical parameter, $I_\alpha' / \pi \rho b^4$, non-dimensional
r	location of wing elastic axis measured from wing mid-chord point as a fraction of the semi-chord (+ aft), non-dimensional
S	mass unbalance per unit span, mx_α^b
t	time, seconds
V	air velocity (free stream), ft/sec
x_α	distance of center of gravity chordwise from elastic axis as a fraction of the semi-chord (+ aft), non-dimensional
x_β	distance of center of gravity of aileron, measured from aileron hinge line, in fraction of the semi-chord (+ aft)
y	distance along span from wing root
α	displacement of wing in rotation from the neutral position, radians/(ft span), (+ nose up)

α_0	displacement of wing in rotation from the neutral position, normalized in three-dimensional case, per unit span, radians
β	angle of aileron with respect to chord line of wing (+ trailing edge downward)
$\Delta_0, \Delta_1, \Delta_2, \Delta_3$	coefficients in the third order stability equation (see Subsection 1207)
ρ	air density
μ	Mach angle = $\text{arc sin } 1/M$ $[\because \cos^2 \mu = (M^2 - 1)/M^2]$
ϕ_1, ϕ_2, ϕ_3	functions of y defining the shapes of vibration modes
ω	circular frequency of oscillation, radians/sec
ω_h	uncoupled natural frequency in translation, $\sqrt{C_h/m}$, radians/sec
ω_α	uncoupled natural frequency in torsion, $\sqrt{C_\alpha/I_\alpha}$, radians/sec
ω_β	uncoupled natural frequency in torsion of aileron, $\sqrt{C_\beta/I_\beta}$, radians/sec
Ω	frequency parameter, $= 2k/\cos^2 \mu = [2M^2/(M^2 - 1)] k$

Auxiliary Symbols

The bar over a symbol ($\bar{\cdot}$) denotes the real component of the complex quantity designated by the associated symbol.

The asterisk (*), used as a superscript, denotes the imaginary component of the complex quantity designated by the associated symbol.

The dot (.) is used to denote differentiation with respect to time, thus $\dot{\alpha} = d\alpha/dt$ and $\ddot{\alpha} = d^2\alpha/dt^2$.

SECTION 12 - AEROELASTIC PHENOMENA

This section of the Handbook of Supersonic Aerodynamics was prepared at the Applied Physics Laboratory of The Johns Hopkins University, with the cooperation of the Bumblebee Committee on Aeroelasticity and Structural Dynamics. Members of this committee were as follows:

M. V. Barton - Defense Research Laboratory,
University of Texas

C. W. Besserer - Applied Physics Laboratory, The Johns
Hopkins University - Chairman

H. A. Cheilek - Cornell Aeronautical Laboratory

M. Dublin - Consolidated Vultee Aircraft Corporation

A. H. Flax - Cornell Aeronautical Laboratory

H. W. Pope - Consolidated Vultee Aircraft Corporation

T. K. Riggs* - Applied Physics Laboratory, The Johns
Hopkins University - Secretary

The original draft of this section was prepared for the Committee by T. K. Riggs in accordance with the Committee's recommendations and suggestions. The final draft was prepared by C. N. Warfield who gratefully acknowledges the helpful comments and suggestions by the members of the Committee and by his colleagues, F. K. Hill, J. P. Kearns, R. M. Mains, and E. Shotland--and the helpful assistance of Mrs. Corine Carwile Bloss who checked many of the equations and the numerical results, computed the numerical example, and prepared the copy for the final graphs.

The tables of flutter coefficients which appear in this section were especially computed, under the supervision of E. C. Kennedy, at the Ordnance Aerophysics Laboratory on International Business Machines Corporation equipment for initial publication in this Handbook.

1200 Introduction

1200.1 General Scope of Section

In this section of the Handbook there are presented certain tables and graphs that may be used, on the basis of flutter considerations, in the design of guided missiles. In addition there is included here a brief treatment of certain theoretical aspects of flutter in the supersonic regime. This treatment includes a derivation of one of the equations for flutter of airfoils in supersonic flow, namely that for torsional flutter of a two-dimensional (infinite) wing.

The tables above referred to (Tables 1208.2) contain the real and imaginary parts of the supersonic force and moment flutter coefficients for airfoils. These flutter coefficients are equivalent to those originally defined by Borbely (Reference 12-1).

* Presently employed by Engineering Research Associates, Inc.

These tables were computed by use of a recursion formula that was devised by E. C. Kennedy, and they are tabulated as a function of a frequency parameter (Ω) for each of several values of Mach number (M). The parameter (Ω) is related to the reduced frequency (k) and to the Mach number (M) by the equation $\Omega = [2M^2/(M^2 - 1)]k$, and a table based on this relationship is presented (Table 1208.1). The reduced frequency is the ratio between the circular frequency of oscillation (ω), in radians per second, and the number of times per second that the wing, due to its forward speed (V), traverses a distance equal to its semi-chord (b).

The tabular values for the flutter coefficients in the great majority of cases are believed to be accurate to within one in the last digit, and in no case is the tabulated value in error by more than two in the last digit. The Mach number range covered is from 1.1 to 12 while the value of Ω ranges from 0.01 to 20. The increments in both M and Ω are in general smaller than in existing similar tables. Because supersonic flutter computations sometimes involve relatively small differences of coefficients, these coefficients have been computed and tabulated in most cases to eight significant figures, although in many applications three or four digits will suffice.

Also included in this section are brief treatments of binary flutter (wing torsion and bending modes) and of ternary flutter (wing torsion, first- and second-bending modes, aileron and wing torsion and bending modes). Both two-dimensional (infinite span) and three-dimensional (finite span) airfoils are analyzed. Brief discussions are given of certain methods of solution for the higher order determinantal equations that appear in some of these analyses. A brief mention of the use of coupled and of uncoupled vibration modes in supersonic flutter is included.

For the purpose of familiarizing the non-specialist with the technique of flutter computations, this section includes a numerical example of an application of the supersonic flutter coefficients. This example is for two-dimensional binary flutter, and is based on the method presented in the Air Materiel Center report entitled "Application of Three-Dimensional Flutter Theory to Aircraft Structures" (Reference 12-2).

In addition to the list of cited references, there is included at the end of this subsection a bibliography of the more pertinent literature on supersonic flutter.

The effects of body motion and the flexibility of attachment of the wing are not discussed in this section since these effects are adequately covered in the literature on subsonic flutter (Reference 12-2). Finite span effects, resulting in a loss of lift force at the wing tip, are not taken into account; however, theoretical studies are available on this subject (References 12-3, 12-4, 12-5, 12-6 and 12-7). Empirical corrections may be used to account for tip effects with some degree of reliability.

The effect of sweepback on the fluctuating aerodynamic forces is somewhat more complicated than the effect on the static lift and moment coefficients for the same type of wing. These sweepback effects are discussed in Reference 12-3. It is possible to calculate the effects of sweepback on the elastic properties of a wing by the use of approximations, provided the aspect ratio is sufficiently high. Whenever a completed structure is available its elastic properties may be obtained from ground vibration tests.

1200.2 Basic Concepts

An airframe at rest on the ground in still air will respond to an impulse in one of three ways. Depending upon the amount of structural damping present it will either execute a series of periodic oscillations of diminishing amplitude, or return to its initial state of rest in the shortest possible time (critically damped), or return more slowly to a state of rest.

If the airframe at rest is subjected to a sinusoidal forcing function it will, after passing through a transient condition, settle into a steady-state vibratory motion with a frequency the same as that of the forcing function, and whose deflections and amplitude of vibration are determined by the applied frequency, as well as by the elastic, inertial, and damping characteristics of the airframe structure.

Since fluctuating aerodynamic forces result from oscillatory motions of an airframe, the response of an airframe to an impulse or sinusoidal forcing function will be determined by these fluctuating aerodynamic forces as well as by the characteristics of the airframe structure. If the phase relationship of the aerodynamic forces is such as to reinforce the motions producing them, then a condition of self-sustaining oscillation is possible. This condition gives rise to what is known as flutter. The flutter frequency is determined by the flight Mach number as well as by the structural characteristics of the airframe.

In flutter analyses computations are made for the critical flutter condition in which the amplitude of vibration tends to remain constant. When the amplitude of vibration increases the condition is considered unsafe; when the amplitude decreases it is considered safe.

The boundary between the safe and unsafe flutter conditions may be identified by investigating the equations of motion. An approximate measure of the margin of safety may be given by the value of the critical structural damping factor computed for the airfoil structure with the aid of the herein tabulated aerodynamic flutter coefficients. Then this value can be compared with the actual structural damping factor obtained experimentally by a vibration test, or by estimation based on experience. Or, the degree of safety from flutter may be estimated by considering the distance between the point on a suitable chart describing the known properties of the wing and the line on the same chart, based on the herein tabulated flutter coefficients, which designates the boundary between the "safe" and "unsafe" regions.

In flutter analyses the computations are based on the frequency, shape and phase relationship of certain vibration modes that are characteristic of the structure. Ideally, the principal* modes as they occur in flight under the aerodynamic conditions that exist during critical flutter oscillations would be used in these flutter analyses. Theoretically, in the case of three-dimensional bodies, there are an infinite number of possible vibration modes. For practical purposes, however, the deformation of an airframe during a state of critical flutter may be assumed to be a combination of the deflections due to the first two, three, or possibly four of the principal modes of vibration--these principal modes correspond to the lower frequencies at which the structure vibrates in resonance. Approximations to these desired modes may be obtained by analytical methods, or by measurements made on the airframe while vibrating either at rest on the ground in still air, or while in flight, or by other experimental means. Reference 12-8 demonstrates the feasibility of basing the analyses upon the actual coupled modes of vibration rather than upon the fictional uncoupled modes.

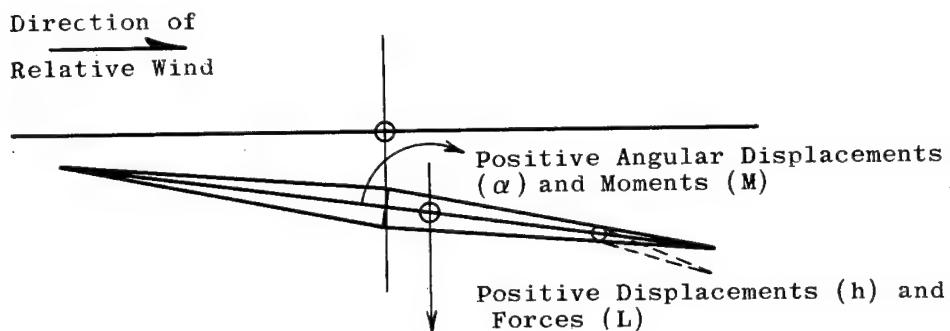
* Sometimes referred to in the literature on flutter as the characteristic, natural, or normal (coupled) modes.

It has been found that flutter may occur in the torsional mode without the presence of a flexure component. This is because at certain frequencies and elastic axis positions the aerodynamic damping is negative, that is, the imaginary component of the aerodynamic moment acts in phase with the angular velocity so as to accelerate the wing in rotation rather than retard it. However, it has been shown that such pure torsional flutter cannot occur at Mach numbers greater than 1.58 (Reference 12-9) for slow oscillations, and the limiting Mach numbers for more rapid oscillations do not differ much from this slow oscillation value.

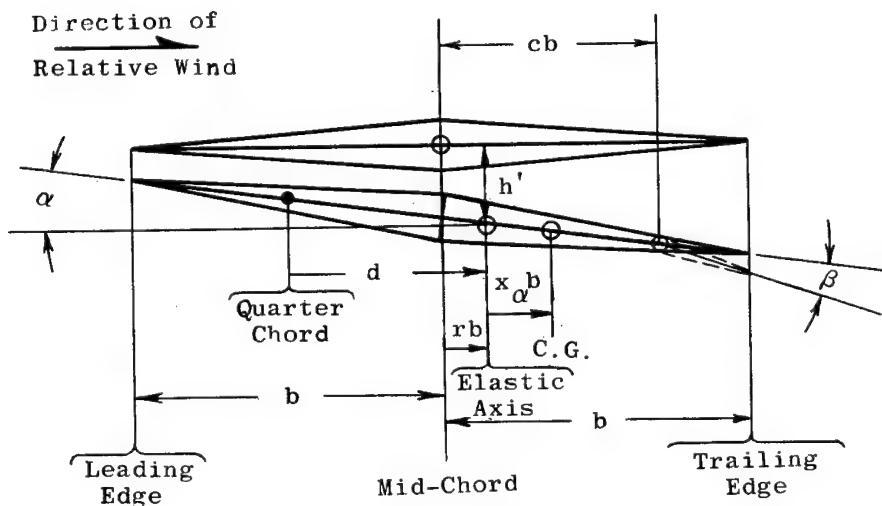
If an unswept wing were to oscillate in bending only, with no rotary motion, then the aerodynamic damping would always be positive, and no flutter involving this mode alone will occur.

1201 Two-Dimensional Torsional Flutter

When an airfoil oscillates in a torsional mode only, various moments about the axis of rotation are involved. For a unit span of the airfoil the elastic restoring moment will be $-C_\alpha \alpha$ (cf. symbols list on pages 1200-1 and 1200-3, and Figure 1201-1), and the structural damping moment is represented as a fraction, g_α , of the elastic restoring moment, rotated in



- a. Directions (The notation as to directions is the same as that of the NACA and the American Standards Association's "Letter Symbols for Aeronautical Sciences, Z-10.7, 1950")



b. Symbols

Figure 1201-1 TWO-DIMENSIONAL WING NOTATIONS

phase so as to lead the latter by 90 degrees. The resultant of these two moments may be represented by $-(1 + i g_\alpha) C_\alpha \dot{\alpha}$, where i is the complex operator $\sqrt{-1}$. The inertial moment per unit span is expressed by $-I'_\alpha \ddot{\alpha}$ and the aerodynamic moment per unit span about the elastic axis is represented here as M' . The sum of these moments is zero, and consequently the aerodynamic moment may be expressed by

$$M' = I'_\alpha \ddot{\alpha} + (1 + ig_\alpha) C_\alpha \dot{\alpha} \quad (1201-1)$$

Consider now the contribution to the aerodynamic moment M' about the elastic axis per unit span due to the rotational displacement α of the wing from the neutral position. If we let the positive aerodynamic force (that is, negative lift L_α), due to this angular displacement, act at a distance d forward of the elastic axis, and let M_α represent the aerodynamic pitching moment about the line passing through the point of application of the aerodynamic force L_α , it is obvious that such a rotational displacement contributes to the moment about the elastic axis an amount (see Figure 1201-2)

$$M_\alpha = L_\alpha d$$

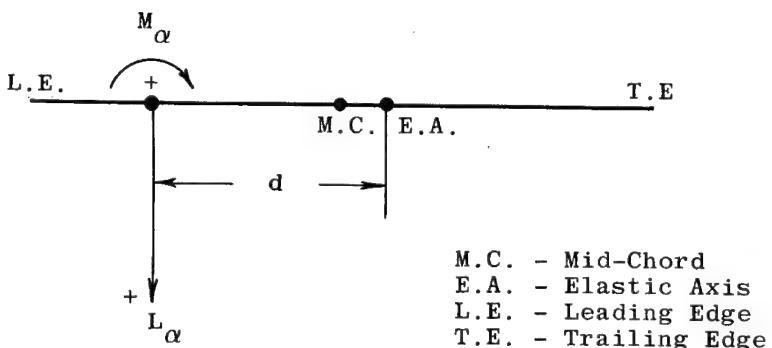


Figure 1201-2 FORCE AND MOMENT NOTATIONS

Likewise, in view of the effect of various time derivatives of displacement (h) of the wing quarter-chord axis which contribute M_h and L_h relative to the quarter-chord, it similarly follows that such a translatory displacement contributes to the moment about the elastic axis an amount

$$M_h = L_h d$$

The total aerodynamic moment about the elastic axis, due to both rotational and translatory motions, is therefore

$$M' = (M_\alpha - L_\alpha d) + (M_h - L_h d) \quad (1201-2)$$

Using aerodynamic force and moment flutter coefficients that are defined by

$$\begin{aligned} C_{Lh} &= \frac{L_h}{\pi \rho b^2 \omega^2 h} \\ C_{L\alpha} &= \frac{L_\alpha}{\pi \rho b^3 \omega^2 \alpha} \\ C_{Mh} &= \frac{M_h}{\pi \rho b^3 \omega^2 h} \\ C_{M\alpha} &= \frac{M_\alpha}{\pi \rho b^4 \omega^2 \alpha} \end{aligned} \quad (1201-3)$$

one finds that Equation 1201-2 becomes

$$M' = \pi \rho b^4 \omega^2 \left[C_{M\alpha} \alpha - C_{L\alpha} \frac{d}{b} \alpha + C_{Mh} \frac{h}{b} - C_{Lh} \frac{hd}{b^2} \right] \quad (1201-4)$$

If, as is customary in subsonic flutter analyses, we assume the lift force to act at the quarter-chord point then

$$d = b \left(\frac{1}{2} + r \right)$$

and we find that Equation 1201-4 becomes

$$M' = \pi \rho b^4 \omega^2 \left[C_{M\alpha} \alpha - C_{L\alpha} \left(\frac{1}{2} + r \right) \alpha + C_{Mh} \left(\frac{1}{2} + r \right) \frac{h}{d} - C_{Lh} \left(\frac{1}{2} + r \right)^2 \frac{h}{d} \right] \quad (1201-5)$$

(Note- This equation for two-dimensional flutter could have been obtained directly from the Borbely-Possio equation (1203-8) by using the relation $h' = h + \alpha d$; cf. Figure 1201-3.)

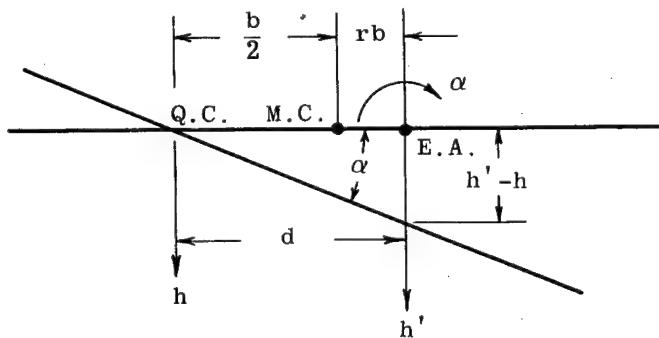


Figure 1201-3 DISPLACEMENT NOTATIONS

To transform the motion parameters from the quarter-chord axis to the elastic axis (see Figure 1201-3), let

$$h' = h + \alpha d \quad (1201-6)$$

For the torsional mode only $h' = 0$; and therefore Equation 1201-6 reduces to

$$\frac{h}{d} = -\alpha \quad (1201-7)$$

Equation 1201-5 then becomes

$$M' = \pi \rho b^4 \omega^2 \alpha \left[C_{M\alpha} - C_{L\alpha} \left(\frac{1}{2} + r \right) - C_{Mh} \left(\frac{1}{2} + r \right) + C_{Lh} \left(\frac{1}{2} + r \right)^2 \right] \quad (1201-8)$$

For harmonic oscillatory motion of rotation, we may write

$$\alpha = \alpha_0 e^{i\omega t} \quad (1201-9)$$

Differentiating α (Equation 1201-9) twice with respect to time, and substituting α and its second time derivative, and Equation 1201-8 into Equation 1201-1, and substituting ω_α^2 for C_α / I_α' , one obtains

$$\left(\frac{\omega_\alpha}{\omega} \right)^2 (1 + ig_\alpha) - 1 + \frac{\pi \rho b^4}{I_\alpha'} \left[-C_{M\alpha} - C_{Lh} \left(\frac{1}{2} + r \right)^2 + C_{L\alpha} \left(\frac{1}{2} + r \right) + C_{Mh} \left(\frac{1}{2} + r \right) \right] = 0 \quad (1201-10)$$

(Note- This equation for two-dimensional torsional flutter could have been obtained from the more general determinantal equation for two-dimensional binary flexure-torsion flutter (Equation 1202-9), by equating the $M_{22} + A_{22}$ element to zero, in which M_{22} and A_{22} are defined by Equations 1202-7 and 1202-10, respectively.)

For convenience, the real and imaginary parts of the aerodynamic coefficient term (i.e., the term included in the brackets) are represented hereafter by \bar{A}_{22} and A_{22}^* respectively, whence

$$\bar{A}_{22} = -\bar{C}_{M\alpha} - \bar{C}_{Lh} \left(\frac{1}{2} + r \right)^2 + \bar{C}_{L\alpha} \left(\frac{1}{2} + r \right) + \bar{C}_{Mh} \left(\frac{1}{2} + r \right) \quad (1201-11)$$

and

$$A_{22}^* = -C_{M\alpha}^* - C_{Lh}^* \left(\frac{1}{2} + r \right)^2 + C_{L\alpha}^* \left(\frac{1}{2} + r \right) + C_{Mh}^* \left(\frac{1}{2} + r \right)$$

The reason for the use of the subscript 22 will be apparent in the subsection on binary flutter, 1202. With this symbolism, Equation 1201-10 becomes

$$\left(\frac{\omega_\alpha}{\omega} \right)^2 (1 + ig_\alpha) - 1 + \frac{\pi \rho b^4}{I_\alpha'} \left(\bar{A}_{22} + iA_{22}^* \right) = 0 \quad (1201-12)$$

Equation 1201-12 may be written as two equations: one including only the real terms, and the other only the imaginary terms. When this is done and the substitution $N = I'_\alpha / \pi \rho b^4$ is made, the following equations may be obtained:

$$\left(\frac{\omega_\alpha}{\omega} \right)^2 = 1 - \frac{\bar{A}_{22}}{N} \quad (1201-13)$$

$$g_\alpha = \frac{-A_{22}^*}{N - \bar{A}_{22}} \quad (1201-14)$$

These equations for two-dimensional torsional flutter may be used for a quick survey of the flutter characteristics of a finite wing if one first obtains an approximate spanwise average value for each of the parameters involved, e.g. I'_α , b , r and ω_α . However, the use of such spanwise average values in the equations for two-dimensional torsional flutter obviously cannot be relied upon for precise results.

When values of ω and M , and therefore also of \bar{A}_{22} and A_{22}^* for a certain elastic axis location (r), are found which satisfy Equations 1201-13 and 1201-14, the conditions for borderline two-dimensional torsional flutter are defined for the conditions represented by the parameters $I'_\alpha / \pi \rho b^4$ and $\omega_\alpha b/a$. The latter term, $\omega_\alpha b/a$, is hereafter referred to as the "reduced natural frequency," k_α .

Several methods may be used to obtain significant data from these equations, two of which are described below.

Method 1. Computation of torsional damping factor g_α .

(a) At each Mach number of interest, using the mechanical parameter N and the elastic axis location r of the wing, determine by means of Equation 1201-13, for a series of values of the frequency parameter Ω , the corresponding values of ω_α/ω . Then the reduced natural frequency k_α can be determined by

$$k_\alpha = M k \left(\frac{\omega_\alpha}{\omega} \right) \quad (1201-15)$$

where k , the reduced frequency, is given by

$$k = \Omega \left(\frac{M^2 - 1}{2M^2} \right)$$

(b) Likewise, by means of Equation 1201-14, one can determine the values of g_α corresponding to the same values of Ω that were used in (a), for the same combination of values of M , r , and N .

(c) For each value of Ω that was used in parts (a) and (b) there has been obtained a pair of values of g_α and of k_α . These pairs of values can then be plotted as in Figures 1201-4a, b, c and d, which represent four combinations of fairly extreme values of r and of N . Of course, figures of this type can be prepared for any desired combination of values for r and N .

If the borderline damping factor g_α thus determined is negative or less positive than the actual structural torsional damping factor for the structure, as determined by damped vibration test data, safety from flutter is indicated; if it is positive and greater than the experimental value, unsafe flutter is indicated.

Method 2. Computation, assuming the torsional damping factor g_α is zero.

If one is interested in determining only a conservative indication of the flutter characteristic of the structure (that is, whether or not the structural parameters are such as to indicate no flutter even if the structural torsional damping factor g_α is zero), then it is necessary to determine from Equations 1201-13 and 1201-14 what combinations of the several parameters correspond to the conservative condition represented by $g_\alpha = 0$. This has been computed for various practical ranges of the several parameters and the results are given in Figures 1201-5. The dashed portions of these curves represent extrapolated values only. In these figures regions above the curves are free from flutter, but below these curves the likelihood of flutter occurring increases with increasing distances. For example, with a structure for which $r=0$, $N=20$ and $k_\alpha = 0.25$, it is evident that flutter is probable only at Mach numbers between 1.133 and 1.311.

Other methods of obtaining and presenting results for single-degree-of-freedom (torsional) flutter are described in References 12-10 and 12-11.

The following facts are important in making a decision as to whether or not an analysis for single-degree-of-freedom (torsional) flutter is adequate in any specific situation:

- (1) For elastic axis positions close to the mid-chord, static divergence (when second-order shift in aerodynamic center location is taken into account) may be more critical than torsional flutter.
- (2) At low supersonic Mach numbers the flow may be transonic in character, and the applicability of linearized supersonic aerodynamic forces used in these analyses would then be in doubt.
- (3) For $(\omega_h / \omega_\alpha) < 1$, the binary flutter stability boundary will usually be more critical than these torsional ones.

For binary flexure-torsion flutter an approximation can be obtained by the method described in Subsection 1202; and for actual finite wings more reliable results can be obtained by means of the equations for three-dimensional binary flexure-torsion flutter that are presented in Subsection 1203.

1 January 1952

Two-Dimensional Torsional

1201-7

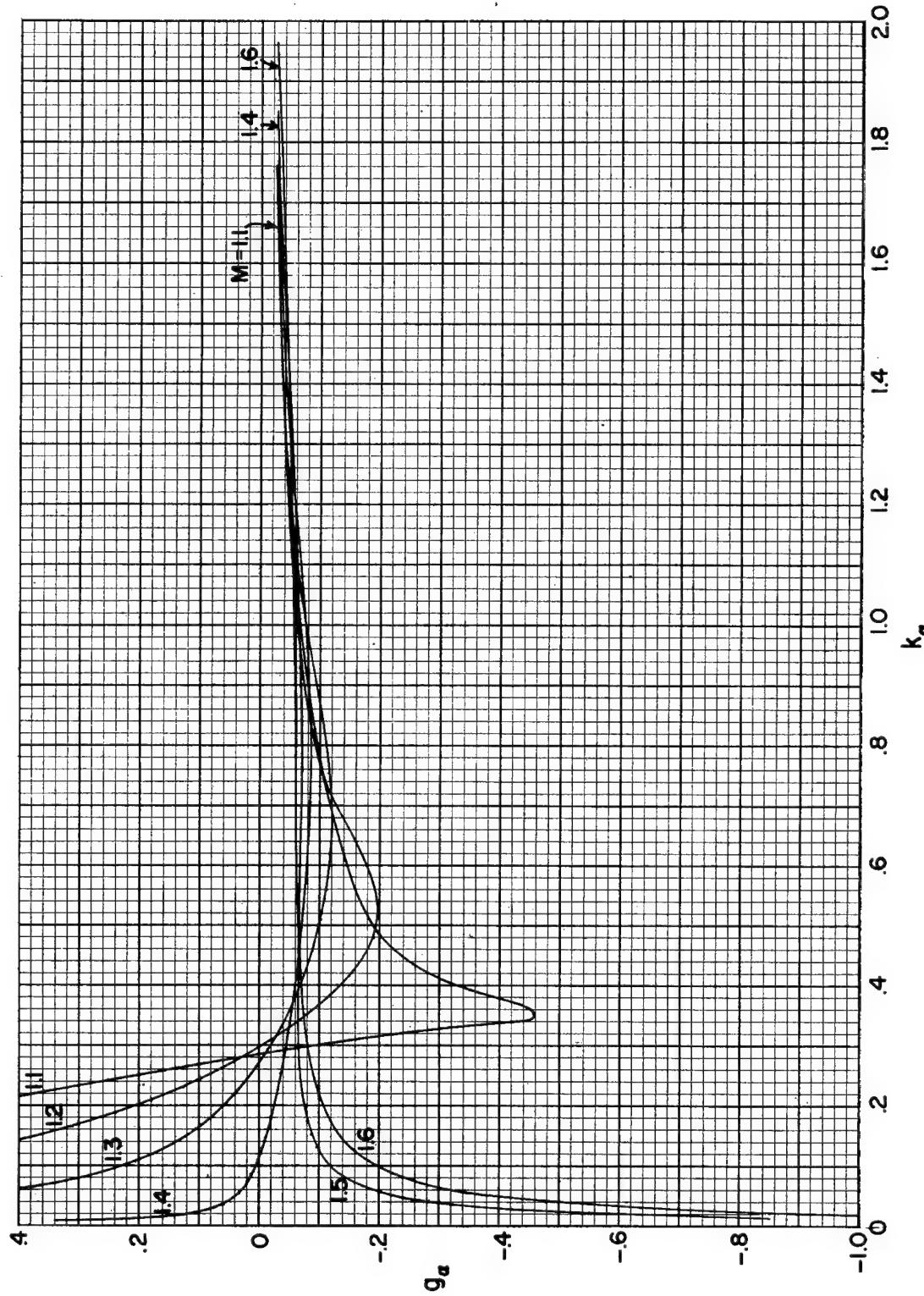


Figure 1201-4a STABILITY BOUNDARIES FOR SINGLE-DEGREE-OF-FREEDOM TORSIONAL FLUTTER;
 g_α vs k_α , MACH NUMBER (M) INDEPENDENT. $r = 0$ and $N = 10$

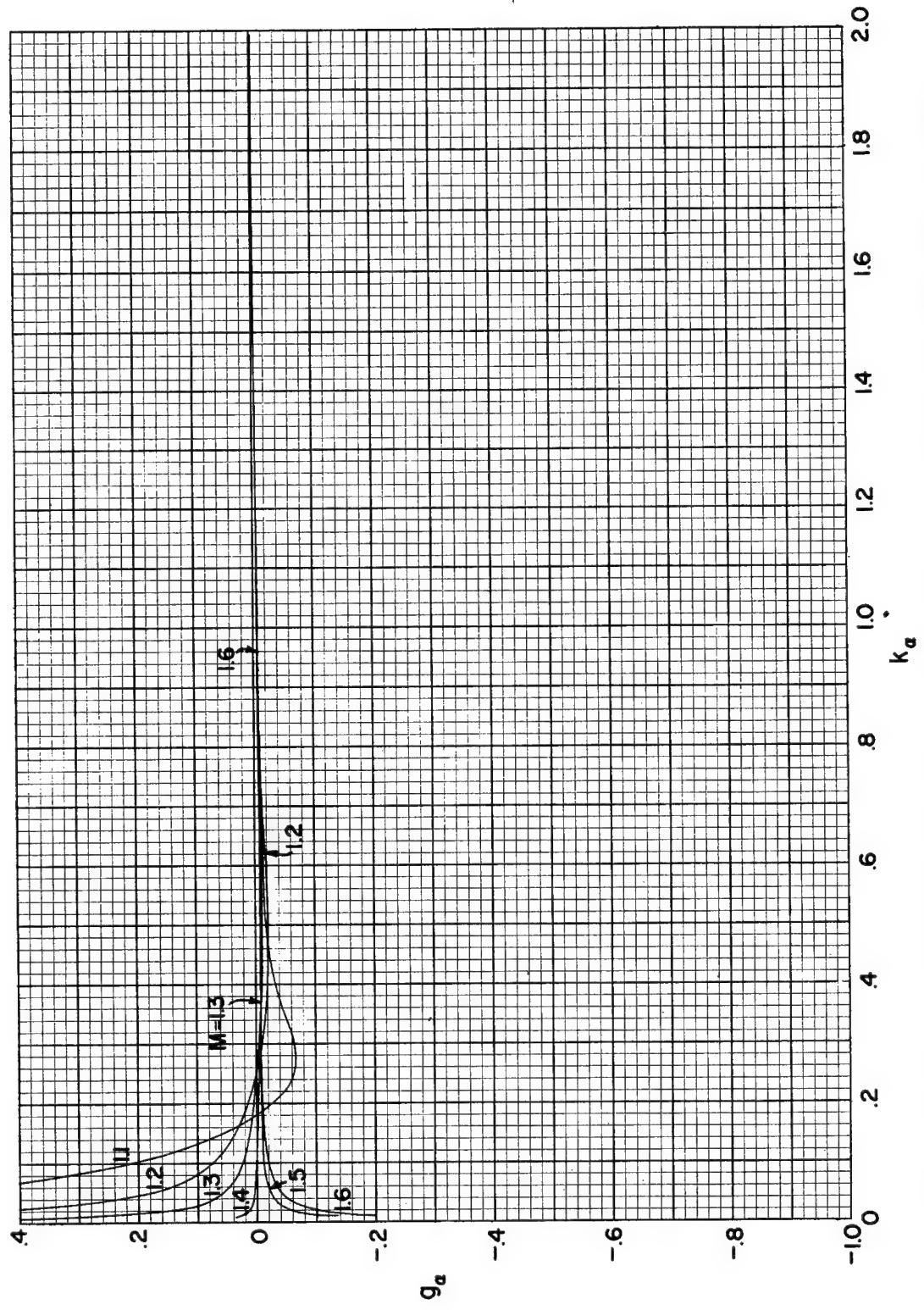


Figure 1201-4b STABILITY BOUNDARIES FOR SINGLE-DEGREE-OF-FREEDOM TORSIONAL FLUTTER;
 g_α vs k_α , MACH NUMBER (M) INDEPENDENT. $r = 0$ and $N = 100$

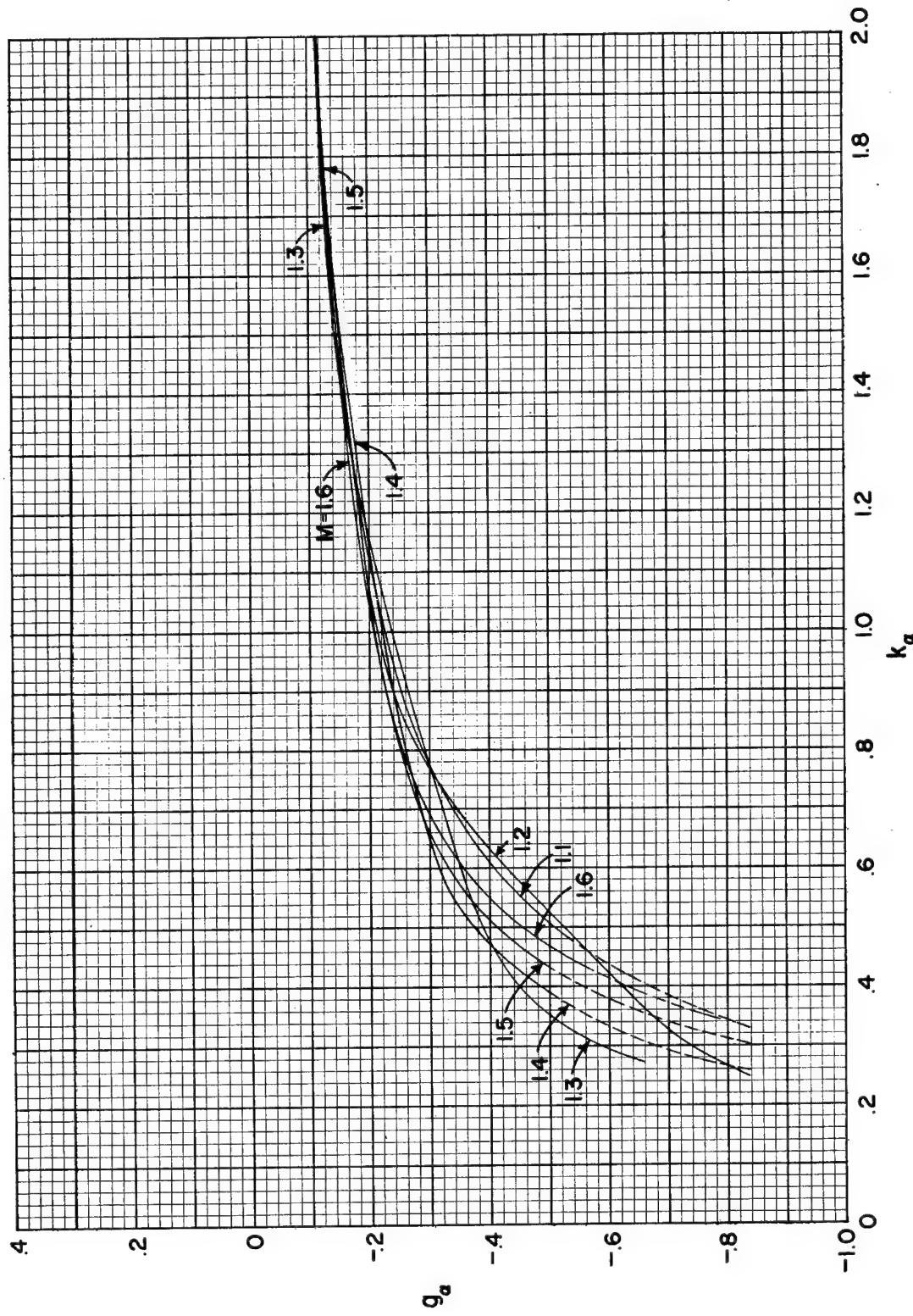


Figure 1201-4c STABILITY BOUNDARIES FOR SINGLE-DEGREE-OF-FREEDOM TORSIONAL FLUTTER;
 g_α vs k_α , MACH NUMBER (M) INDEPENDENT. $r = -1.2$ and $N = 10$

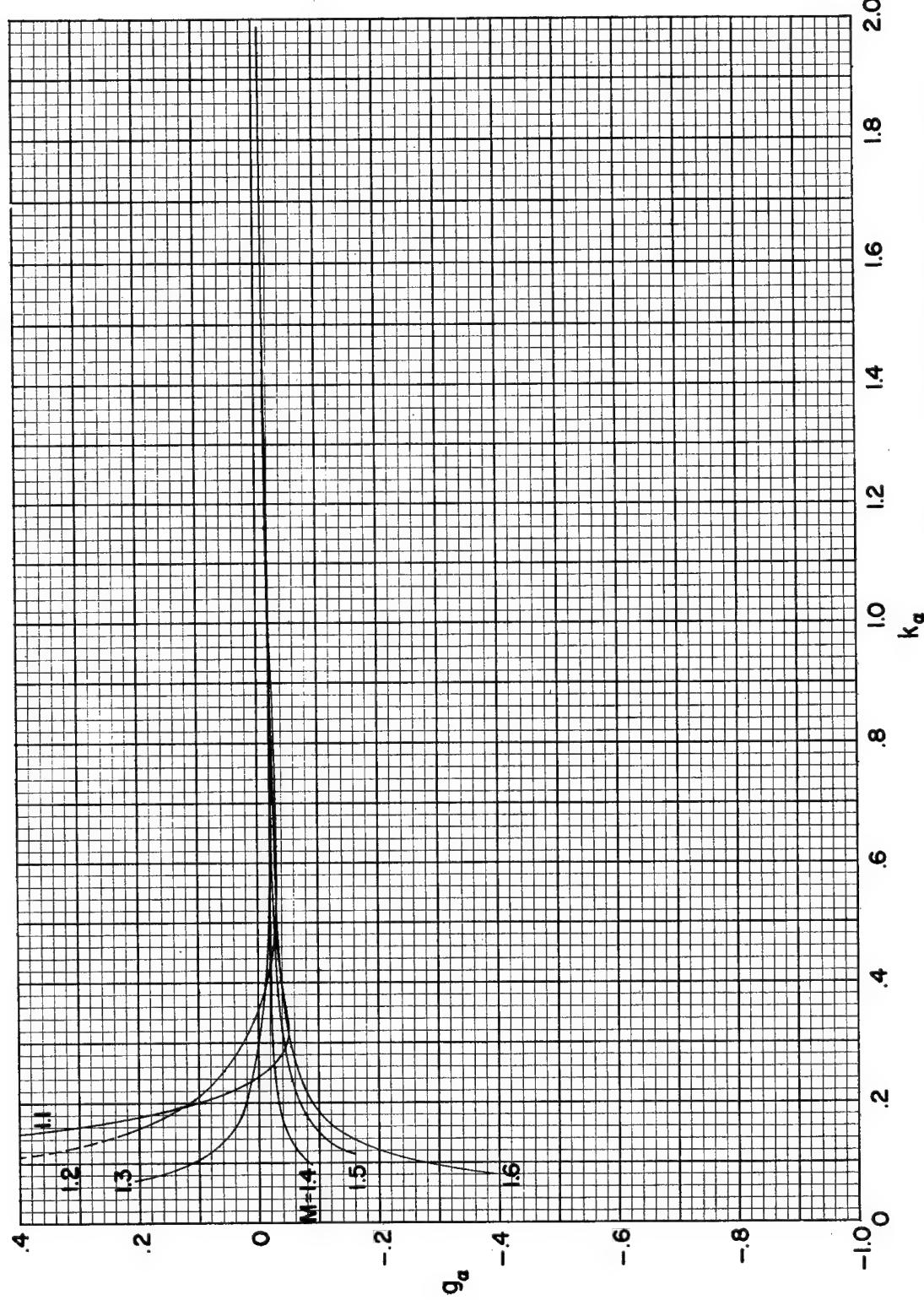


Figure 1201-4d STABILITY BOUNDARIES FOR SINGLE-DEGREE-OF-FREEDOM TORSIONAL FLUTTER;
 \bar{g}_α vs k_α , MACH NUMBER (M) INDEPENDENT. $r = -1.2$ and $N = 100$

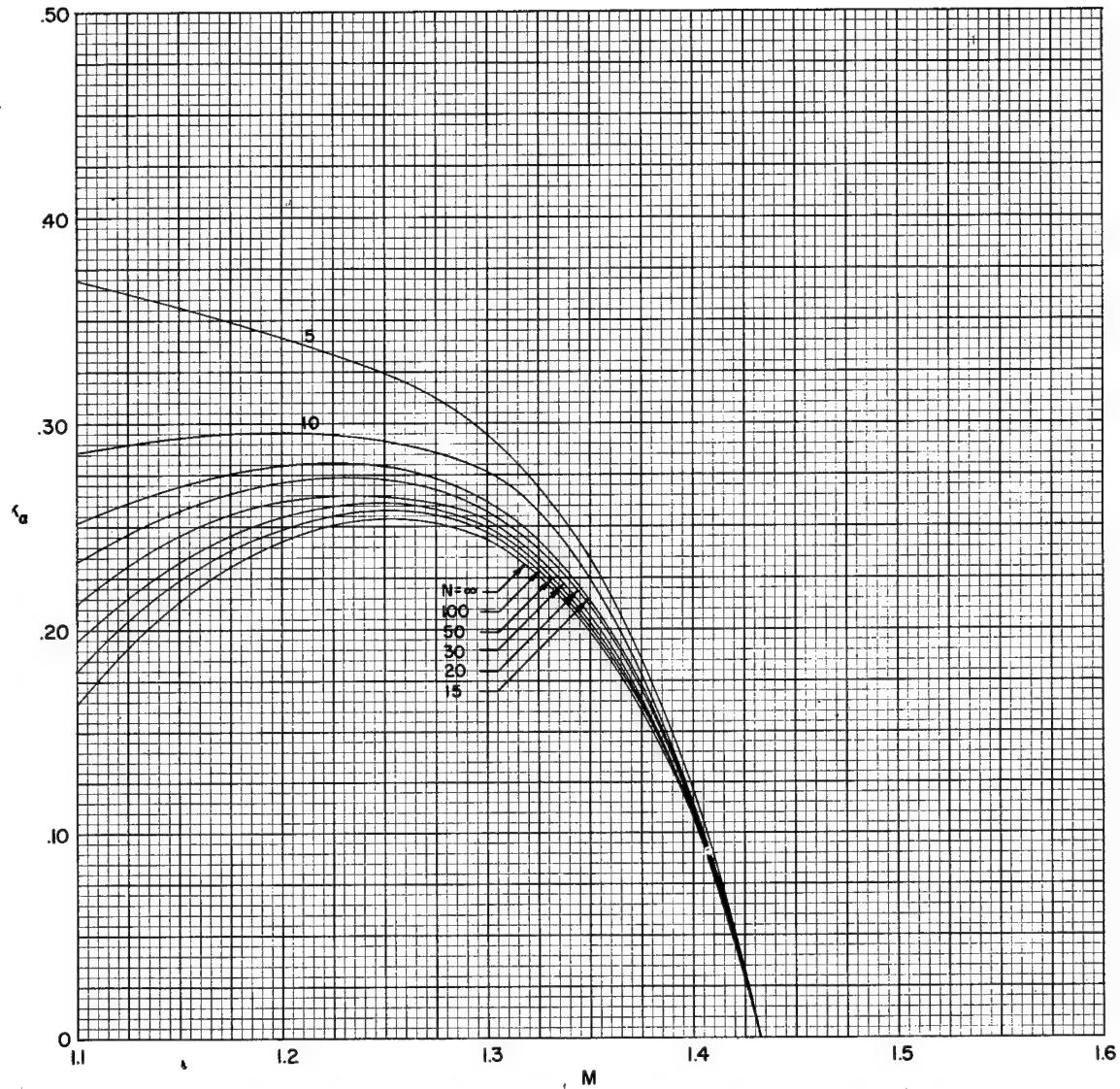


Figure 1201-5a STABILITY BOUNDARIES FOR SINGLE-DEGREE-OF-FREEDOM
TORSIONAL FLUTTER FOR ZERO DAMPING ($g_\alpha = 0$).
 $r = 0$

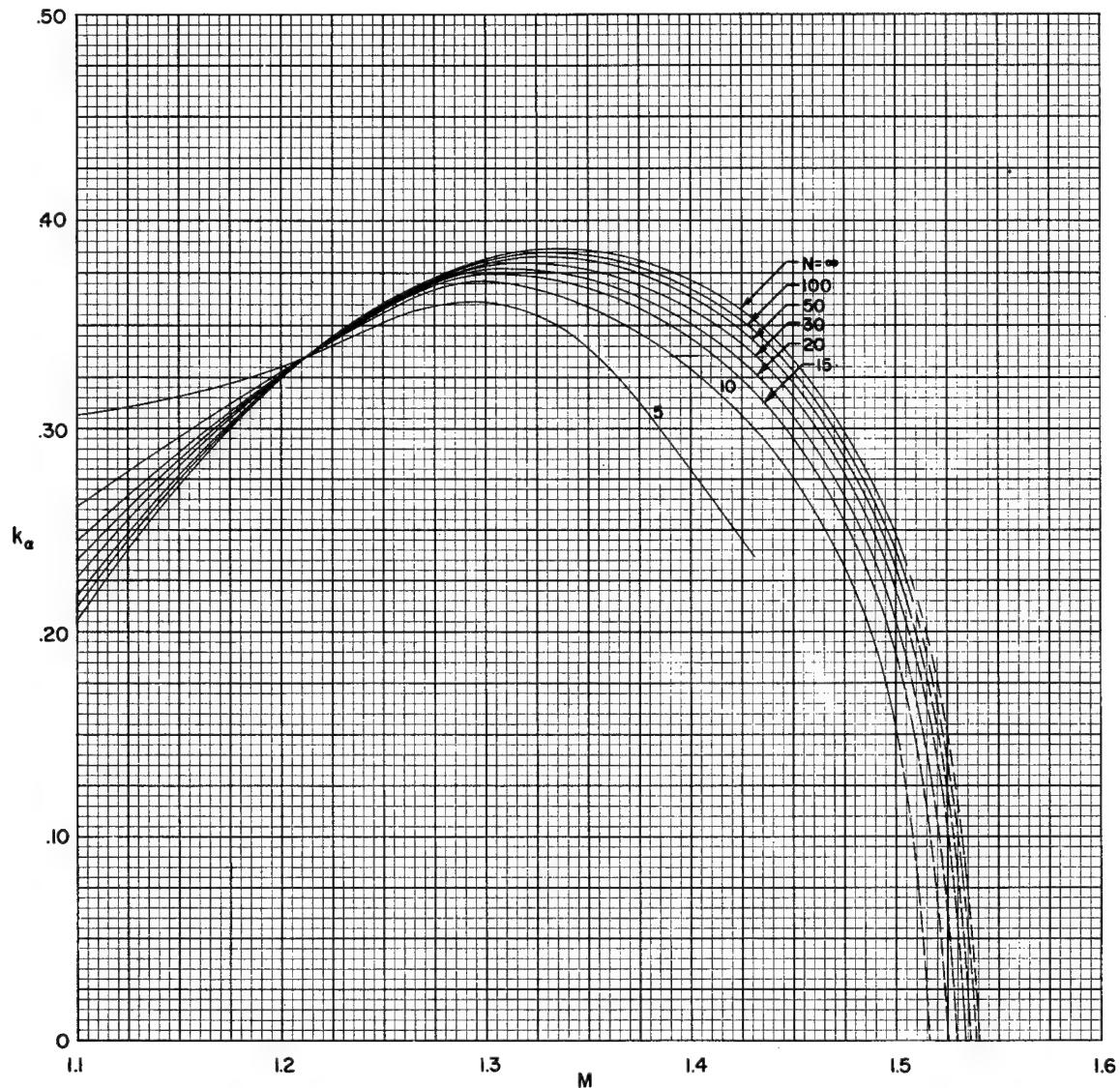


Figure 1201-5b STABILITY BOUNDARIES FOR SINGLE-DEGREE-OF-FREEDOM
TORSIONAL FLUTTER FOR ZERO DAMPING ($g_{\alpha} = 0$).
 $r = -0.2$

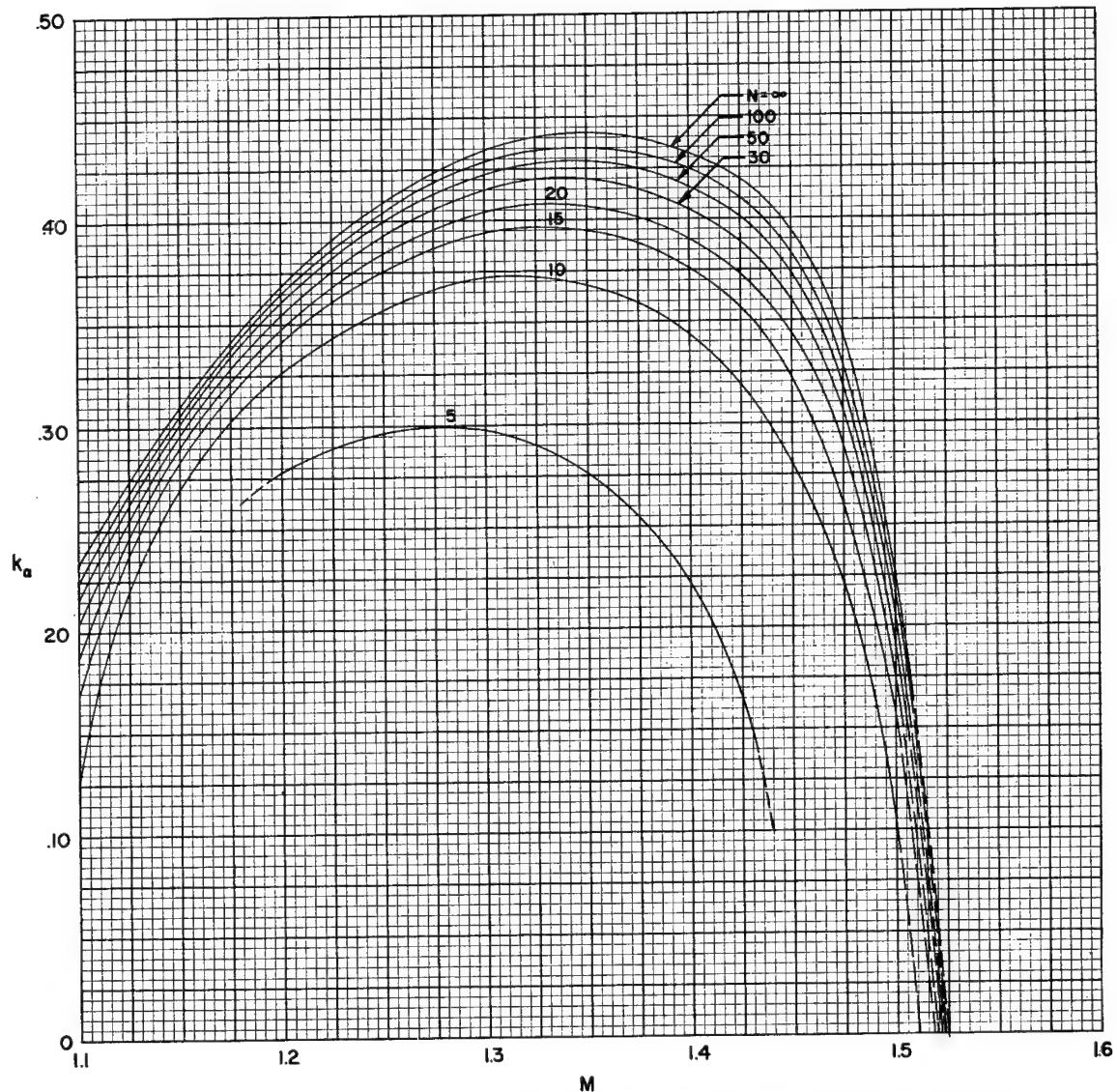


Figure 1201-5c STABILITY BOUNDARIES FOR SINGLE-DEGREE-OF-FREEDOM
TORSIONAL FLUTTER FOR ZERO DAMPING ($g_\alpha = 0$).
 $r = -0.4$

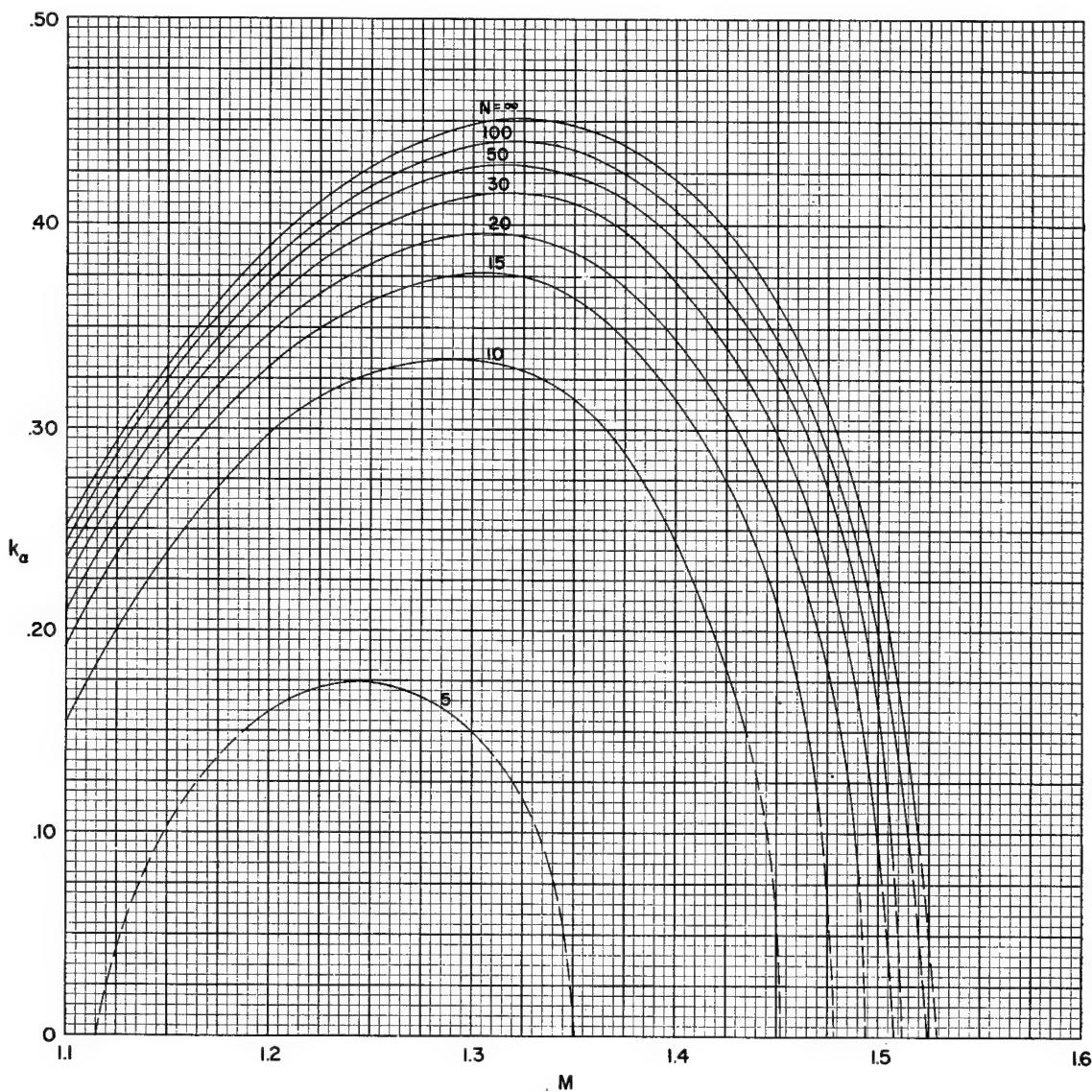


Figure 1201-5d STABILITY BOUNDARIES FOR SINGLE-DEGREE-OF-FREEDOM
TORSIONAL FLUTTER FOR ZERO DAMPING ($g_{\alpha} = 0$).
 $r = -0.6$

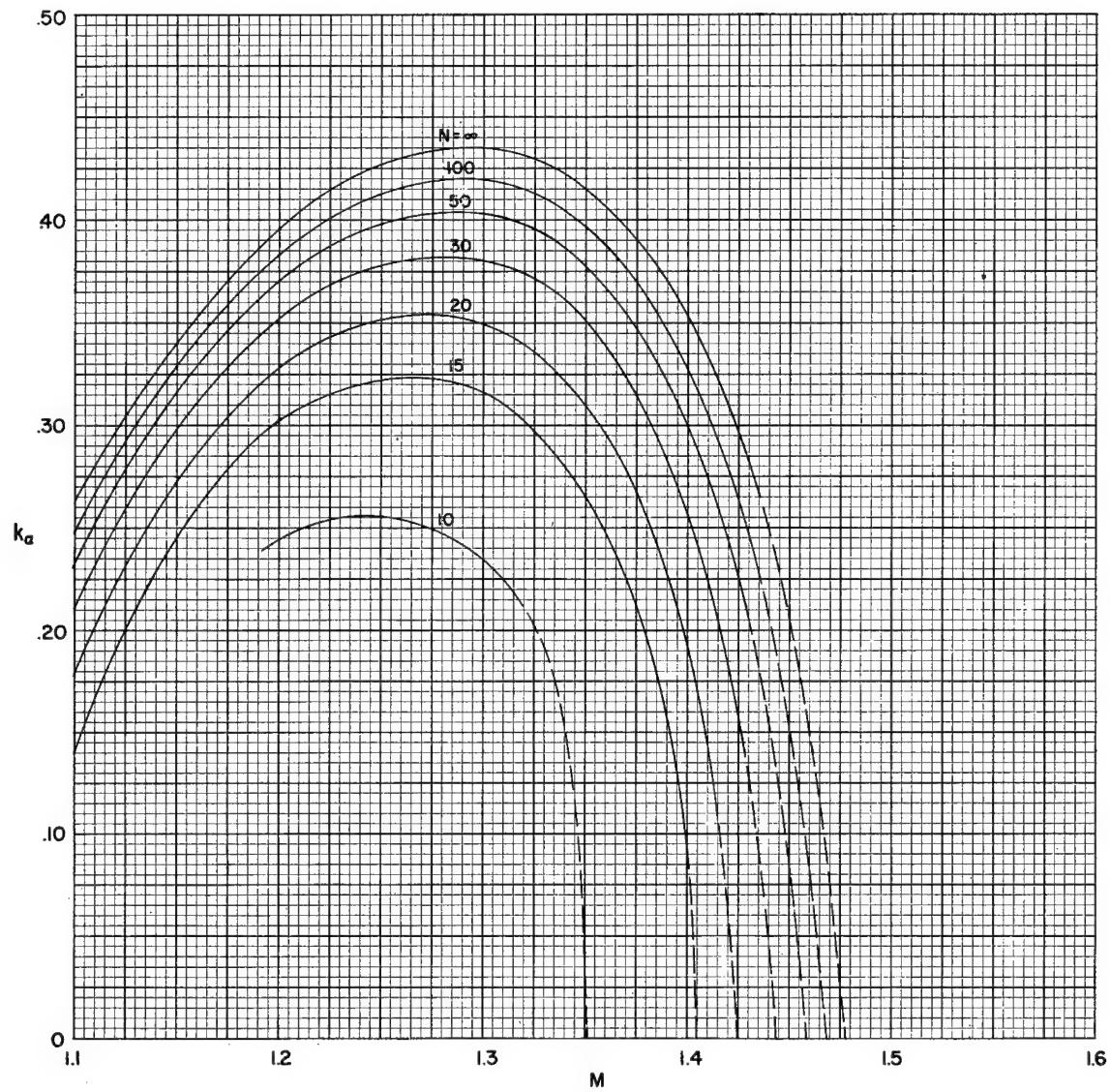


Figure 1201-5e STABILITY BOUNDARIES FOR SINGLE-DEGREE-OF-FREEDOM
TORSIONAL FLUTTER FOR ZERO DAMPING ($g_\alpha = 0$).
 $r = -0.8$

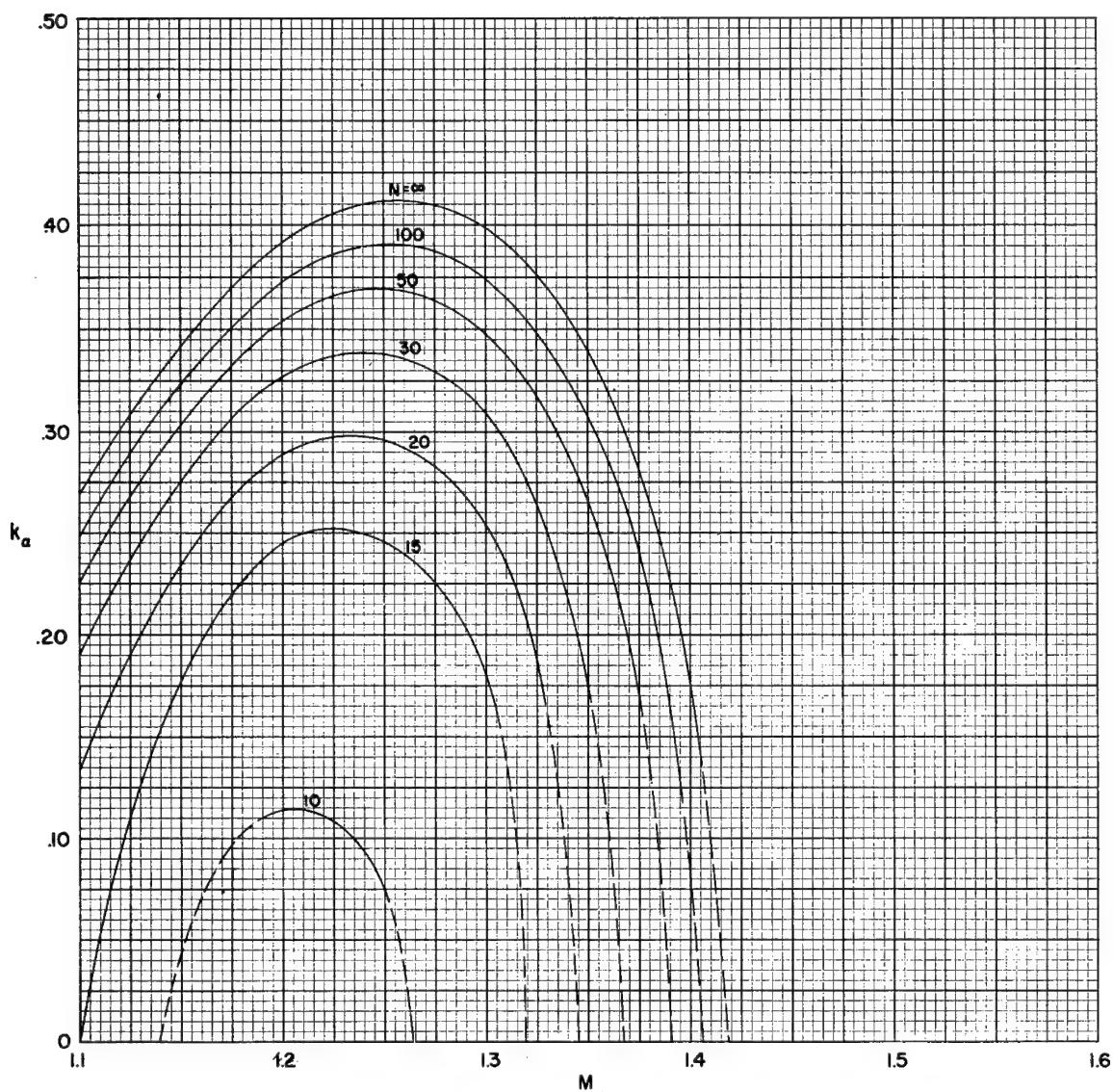


Figure 1201-5f STABILITY BOUNDARIES FOR SINGLE-DEGREE-OF-FREEDOM
TORSIONAL FLUTTER FOR ZERO DAMPING ($g_\alpha = 0$).
 $r = -1.0$

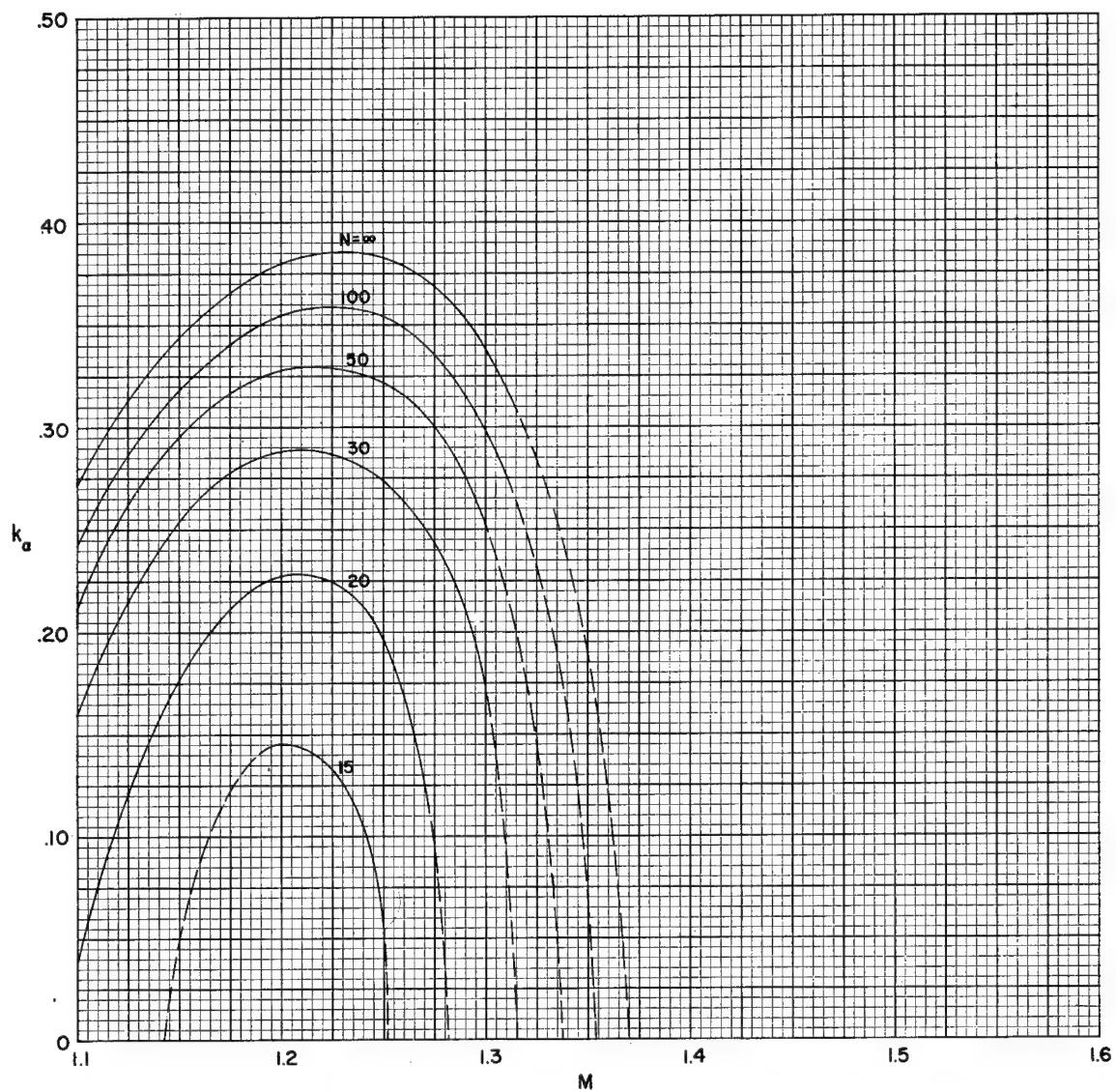


Figure 1201-5g STABILITY BOUNDARIES FOR SINGLE-DEGREE-OF-FREEDOM
TORSIONAL FLUTTER FOR ZERO DAMPING ($g_\alpha = 0$).
 $r = -1.2$

1202 Two-Dimensional Binary Flexure-Torsion Flutter

The equations of motion for a two-dimensional airfoil in flexure and torsion are most easily derived (References 12-12 and 12-13) by use of the Lagrangian equations

$$\frac{d}{dt} \left(\frac{\partial E_k}{\partial \dot{q}_1} \right) + \frac{\partial E_e}{\partial q_1} + \frac{\partial F}{\partial \dot{q}_1} - L_g = 0 \quad (1202-1)$$

and

$$\frac{d}{dt} \left(\frac{\partial E_k}{\partial \dot{q}_2} \right) + \frac{\partial E_e}{\partial q_2} + \frac{\partial F}{\partial \dot{q}_2} - M_g = 0$$

The quantities q_1 and q_2 are the generalized coordinates describing the motion of the system; they may be considered as the translational displacement h' of the wing elastic axis, and the angular displacement α , respectively, although this choice is not essential. Thus, for harmonic oscillatory motions we get:

$$\begin{aligned} h' &= q_1 = h'_o e^{i\omega t} \\ \alpha &= q_2 = \alpha_o e^{i\omega t} \end{aligned} \quad (1202-2)$$

The quantities L_g and M_g are the generalized aerodynamic force and moment per unit span, respectively.

The kinetic energy E_k of the system per unit span can be written as the sum of the translational and rotational energies about an axis through the center of gravity, as follows,

$$E_k = \frac{1}{2} m \left[h' + x_{\alpha} b \dot{\alpha} \right]^2 + \frac{1}{2} \left[I'_{\alpha} - m (x_{\alpha} b)^2 \right] \dot{\alpha}^2 \quad (1202-3)$$

Expanding, substituting S for the mass unbalance quantity $m x_{\alpha} b$, and also writing the equations for the elastic energy E_e and half the rate of energy dissipation F per unit span, one obtains:

$$\begin{aligned} E_k &= \frac{1}{2} (m h'^2 + 2S h' \dot{\alpha} + I'_{\alpha} \dot{\alpha}^2) \\ E_e &= \frac{1}{2} (C_h h'^2 + C_{\alpha} \dot{\alpha}^2) \\ F &= \frac{1}{2} \left(\frac{g_h C_h}{\omega} h'^2 + \frac{g_{\alpha} C_{\alpha}}{\omega} \dot{\alpha}^2 \right) \end{aligned} \quad (1202-4)$$

By introducing the generalized coordinates q_1 and q_2 (Equations 1202-2) into these energy equations, taking derivatives, and then substituting into the Lagrangian equations of motion (Equations 1202-1), we have:

$$-\omega^2 m h'_o e^{i\omega t} - \omega^2 S \alpha_o e^{i\omega t} + C_h h'_o e^{i\omega t} + i g_h C_h h'_o e^{i\omega t} - L_g = 0 \quad (1202-5)$$

$$-\omega^2 I'_\alpha \alpha'_o e^{i\omega t} - \omega^2 S h'_o e^{i\omega t} + C_\alpha \alpha'_o e^{i\omega t} + i g_\alpha C_\alpha \alpha'_o e^{i\omega t} - M_g = 0$$

The generalized force and moment per unit span on a two-dimensional wing about the elastic axis (see Equations 1203-10) are:

$$\begin{aligned} L_g &= L' = -\pi \rho b^3 \omega^2 e^{i\omega t} \left(A_{11} \frac{h'_o}{b} + A_{12} \alpha_o \right) \\ M_g &= M' = -\pi \rho b^4 \omega^2 e^{i\omega t} \left(A_{21} \frac{h'_o}{b} + A_{22} \alpha_o \right) \end{aligned} \quad (1202-6)$$

where (see Equations 1203-9)

$$\begin{aligned} A_{11} &= -C_{Lh} \\ A_{12} &= C_{Lh} \left(\frac{1}{2} + r \right) - C_{L\alpha} \\ A_{21} &= C_{Lh} \left(\frac{1}{2} + r \right) - C_{Mh} \\ A_{22} &= -C_{M\alpha} - C_{Lh} \left(\frac{1}{2} + r \right)^2 + (C_{L\alpha} + C_{Mh}) \left(\frac{1}{2} + r \right) \end{aligned} \quad (1202-7)$$

By combining Equations 1202-5 and 1202-6, and rearranging (since

$\omega_h = \sqrt{C_h/m}$, $\omega_\alpha = \sqrt{C_\alpha/I'_\alpha}$, and $S = mx_\alpha b$), we have:

$$\int \frac{m}{\pi \rho b^2} \left[\left(\frac{\omega_h}{\omega} \right)^2 (1 + ig_h) - 1 \right] + A_{11} \frac{h'_o}{b} + \left\{ -\frac{mx_\alpha}{\pi \rho b^2} + A_{12} \right\} \alpha_o = 0 \quad (1202-8)$$

$$\left\{ -\frac{mx_\alpha}{\pi \rho b^2} + A_{21} \right\} \frac{h'_o}{b} + \left\{ \frac{I'_\alpha}{\pi \rho b^4} \left[\left(\frac{\omega_\alpha}{\omega} \right)^2 (1 + ig_\alpha) - 1 \right] + A_{22} \right\} \alpha_o = 0$$

In order for a solution to exist, the determinant of Equations 1202-8 must vanish. That is,

$$\begin{vmatrix} M_{11} + A_{11} & M_{12} + A_{12} \\ M_{21} + A_{21} & M_{22} + A_{22} \end{vmatrix} = 0 \quad (1202-9)$$

where

$$\begin{aligned} M_{11} &= \frac{m}{\pi \rho b^2} \left[\left(\frac{\omega_h}{\omega} \right)^2 (1 + ig_h) - 1 \right] \\ M_{12} = M_{21} &= - \frac{m x \alpha}{\pi \rho b^2} \\ M_{22} &= \frac{I' \alpha}{\pi \rho b^4} \left[\left(\frac{\omega \alpha}{\omega} \right)^2 (1 + ig_\alpha) - 1 \right] \end{aligned} \quad (1202-10)$$

Some methods of solving the determinantal equation for two-dimensional binary flutter will be covered in Subsection 1204. The determinantal equations of motion derived here (Equations 1202-7, 1202-9 and 1202-10) are identical to those presented in Reference 12-14.

1203 Three-Dimensional Binary Flexure-Torsion Flutter

Let the quantities, h' and α , describing the motion of the three-dimensional (finite) wing referred to the elastic axis be defined by (cf. Equations 1202-2)

$$h' = \phi_1 q_1 = \phi_1 h'_o e^{i\omega t} \quad (1203-1)$$

$$\alpha = \phi_2 q_2 = \phi_2 \alpha'_o e^{i\omega t}$$

where ϕ_1 and ϕ_2 are functions of the spanwise position, y . The quantities q_1 and q_2 are generalized coordinates; they may be considered respectively as the displacement of, and rotation at, the tip of the wing, although in any specific case some other quantity may be more convenient.

The kinetic energy E_k in such a system may be found from the spanwise integration (cf. Equation 1202-4)

$$E_k = \frac{1}{2} \left[\int_0^L m h'^2 dy + 2 \int_0^L S h' \dot{\alpha} dy + \int_0^L I'_\alpha \dot{\alpha}^2 dy \right] \quad (1203-2a)$$

The elastic energy E_e in such a system is

$$E_e = \frac{1}{2} \left[\int_0^L EI \left(\frac{d^2 h'}{dy^2} \right)^2 dy + \int_0^L GJ \left(\frac{d\alpha}{dy} \right)^2 dy \right] \quad (1203-2b)$$

One-half the rate of energy dissipation is

$$F = \frac{1}{2} \left[- \frac{g_h}{\omega} \int_0^L EI \left(\frac{d^2 h'}{dy^2} \right)^2 dy - \frac{g_\alpha}{\omega} \int_0^L GJ \left(\frac{d\alpha}{dy} \right)^2 dy \right] \quad (1203-2c)$$

Since h' and α have been defined in Equations 1203-1, derivatives necessary for substitution in Equations 1203-2 may be formed. After substitution we have:

$$\begin{aligned} E_k &= \frac{1}{2} \left[\int_0^L m \phi_1^2 \dot{q}_1^2 dy + 2 \int_0^L S \phi_1 \phi_2 \dot{q}_1 \dot{q}_2 dy + \int_0^L I'_\alpha \phi_2^2 \dot{q}_2^2 dy \right] \\ E_e &= \frac{1}{2} \left[\int_0^L EI \dot{q}_1^2 \left(\frac{d^2 \phi_1}{dy^2} \right)^2 dy + \int_0^L GJ \dot{q}_2^2 \left(\frac{d\phi_2}{dy} \right)^2 dy \right] \\ F &= \frac{1}{2} \left[- \frac{g_h}{\omega} \int_0^L EI \dot{q}_1^2 \left(\frac{d^2 \phi_1}{dy^2} \right)^2 dy - \frac{g_\alpha}{\omega} \int_0^L GJ \dot{q}_2^2 \left(\frac{d\phi_2}{dy} \right)^2 dy \right] \end{aligned} \quad (1203-3)$$

The Lagrangian equations of motion for such a system of two degrees of freedom are (cf. Equations 1202-1):

$$\frac{d}{dt} \left(\frac{\partial E_k}{\partial \dot{q}_1} \right) + \frac{\partial E_e}{\partial q_1} + \frac{\partial F}{\partial \dot{q}_1} - L_g = 0 \quad (1203-4)$$

$$\frac{d}{dt} \left(\frac{\partial E_k}{\partial \dot{q}_2} \right) + \frac{\partial E_e}{\partial q_2} + \frac{\partial F}{\partial \dot{q}_2} - M_g = 0$$

where L_g and M_g are the generalized aerodynamic force and moment per unit span acting on the wing, referred to the generalized coordinates q_1 and q_2 , respectively. The former will be more fully defined in Equations 1203-7 and 1203-8, respectively.

Taking the necessary partial derivatives of the energy equations (1203-3) and substituting into the Lagrangian equations (1203-4), we have:

$$\begin{aligned} & -\omega^2 e^{i\omega t} h'_o \int_0^l m \phi_1^2 dy - \omega^2 e^{i\omega t} \alpha'_o \int_0^l S \phi_1 \phi_2 dy + h'_o e^{i\omega t} \int_0^l EI \left(\frac{d^2 \phi_1}{dy^2} \right)^2 dy \\ & + i g_h h'_o e^{i\omega t} \int_0^l EI \left(\frac{d^2 \phi_1}{dy^2} \right)^2 dy - L_g = 0 \end{aligned} \quad (1203-5)$$

$$\begin{aligned} & -\omega^2 e^{i\omega t} h'_o \int_0^l S \phi_1 \phi_2 dy - \omega^2 e^{i\omega t} \alpha'_o \int_0^l I'_\alpha \phi_2^2 dy + \alpha'_o e^{i\omega t} \int_0^l GJ \left(\frac{d \phi_2}{dy} \right)^2 dy \\ & + i g_\alpha \alpha'_o e^{i\omega t} \int_0^l GJ \left(\frac{d \phi_2}{dy} \right)^2 dy - M_g = 0 \end{aligned} \quad (1203-6)$$

Borbely's and Possio's equations for the lift and moment on a unit span of two-dimensional wing oscillating in flexure and torsion are derived in References 12-1 and 12-15, respectively, and are reproduced in Reference 12-14. Using the coefficients defined by Equations 1201-3, the force and moment about the elastic axis may be written, respectively:

$$L' = -\pi \rho b^3 \omega^2 e^{i\omega t} \left\{ -C_{Lh} \frac{h'_o}{b} + \left[\left(\frac{1}{2} + r \right) C_{Lh} - C_{L\alpha} \right] \alpha'_o \right\} \quad (1203-7)$$

$$\begin{aligned} M' = -\pi \rho b^4 \omega^2 e^{i\omega t} & \left\{ \left[-C_{Mh} + \left(\frac{1}{2} + r \right) C_{Lh} \right] \frac{h'_o}{b} + \left[-C_{M\alpha} \right. \right. \\ & \left. \left. - C_{Lh} \left(\frac{1}{2} + r \right)^2 + C_{L\alpha} \left(\frac{1}{2} + r \right) + C_{Mh} \left(\frac{1}{2} + r \right) \right] \alpha'_o \right\} \end{aligned} \quad (1203-8)$$

(Note- This equation for M' is derived independently in Subsection 1201; see Equation 1201-5 and the note that follows it.)

For convenience, let

$$\begin{aligned} A_{11} &= -C_{Lh} \\ A_{12} &= C_{Lh} \left(\frac{1}{2} + r \right) - C_{L\alpha} \\ A_{21} &= C_{Lh} \left(\frac{1}{2} + r \right) - C_{Mh} \\ A_{22} &= -C_{M\alpha} - C_{Lh} \left(\frac{1}{2} + r \right)^2 + C_{L\alpha} \left(\frac{1}{2} + r \right) + C_{Mh} \left(\frac{1}{2} + r \right) \end{aligned} \quad (1203-9)$$

Then, for two-dimensional wings,

$$\begin{aligned} L' &= -\pi\rho b^3 \omega^2 e^{i\omega t} \left(A_{11} \frac{h'_o}{b} + A_{12} \alpha_o \right) \\ M' &= -\pi\rho b^4 \omega^2 e^{i\omega t} \left(A_{21} \frac{h'_o}{b} + A_{22} \alpha_o \right) \end{aligned} \quad (1203-10)$$

For three-dimensional wings, taking into account the spanwise variations of displacement (cf. Equations 1202-2 and 1203-1), we have

$$\begin{aligned} L' &= -\pi\rho b^3 \omega^2 e^{i\omega t} \left(A_{11} \frac{\phi_1 h'_o}{b} + A_{12} \phi_2 \alpha_o \right) \\ M' &= -\pi\rho b^4 \omega^2 e^{i\omega t} \left(A_{21} \frac{\phi_1 h'_o}{b} + A_{22} \phi_2 \alpha_o \right) \end{aligned} \quad (1203-11)$$

By the principle of virtual work, and by use of Equations 1203-1 and 1203-11, the generalized moments and forces may then be expressed as follows:

$$\begin{aligned} L_g &= -\pi\rho \omega^2 e^{i\omega t} \left[h'_o \int_0^l b^2 A_{11} \phi_1^2 dy + \alpha_o \int_0^l b^3 A_{12} \phi_1 \phi_2 dy \right] \\ M_g &= -\pi\rho \omega^2 e^{i\omega t} \left[h'_o \int_0^l b^3 A_{21} \phi_1 \phi_2 dy + \alpha_o \int_0^l b^4 A_{22} \phi_2^2 dy \right] \end{aligned} \quad (1203-12)$$

These may be substituted into Equations 1203-5 and 1203-6, respectively, to obtain the equations of motion, thus:

$$\begin{aligned} (M'_{11} + A'_{11}) h'_o + (M'_{12} + A'_{12}) \alpha_o &= 0 \\ (M'_{21} + A'_{21}) h'_o + (M'_{22} + A'_{22}) \alpha_o &= 0 \end{aligned} \quad (1203-13)$$

A necessary condition for the existence of a solution of these equations is

$$\begin{vmatrix} M'_{11} + A'_{11} & M'_{12} + A'_{12} \\ M'_{21} + A'_{21} & M'_{22} + A'_{22} \end{vmatrix} = 0 \quad (1203-14)$$

where

$$\begin{aligned}
 M'_{11} &= - \int_0^l m \phi_1^2 dy + \frac{1}{\omega^2} (1 + ig_h) \int_0^l EI \left(\frac{d^2 \phi_1}{dy^2} \right)^2 dy \\
 M'_{12} = M'_{21} &= - \int_0^l S \phi_1 \phi_2 dy \\
 M'_{22} &= - \int_0^l I'_\alpha \phi_2^2 dy + \frac{1}{\omega^2} (1 + ig_\alpha) \int_0^l GJ \left(\frac{d \phi_2}{dy} \right)^2 dy \\
 A'_{11} &= \pi \rho \int_0^l b^2 A_{11} \phi_1^2 dy, \\
 A'_{12} &= \pi \rho \int_0^l b^3 A_{12} \phi_1 \phi_2 dy \\
 A'_{21} &= \pi \rho \int_0^l b^3 A_{21} \phi_1 \phi_2 dy \\
 A'_{22} &= \pi \rho \int_0^l b^4 A_{22} \phi_2^2 dy
 \end{aligned} \tag{1203-15}$$

In general, for three-dimensional wings, each factor in every one of the foregoing integrands is a function of its spanwise location, for various reasons as indicated below:

Wing Characteristic Determining the Spanwise Function	Quantities So Determined
Mass distribution	m, S, I'_α
Material	E, G
Cross-section form	I, J
Planform	b
Planform and elastic axis location	$A_{11}, A_{12}, A_{21}, A_{22}$
Mode shape in flexure	ϕ_1
Mode shape in torsion	ϕ_2

Further, it is seen that the quantities M'_{11} , M'_{12} , M'_{21} , and M'_{22} are functions of the mechanical parameters and frequency, but not of the flight conditions. However, the aerodynamic terms A'_{11} , A'_{12} , A'_{21} and A'_{22} , are functions of Mach number and the location of the elastic axis relative to the mid-chord line, as well as of the frequency and certain mechanical parameters.

For special cases, the above equations may be simplified to a large extent; for instance, a uniform rectangular cantilever wing would enable the computer to remove all terms other than ϕ_1 and ϕ_2 from the integrands.

Several methods of solving the determinantal equations (e.g. Equations 1202-9 and 1203-14) are possible. A method based on that of the U. S. Air Force Air Materiel Command (Reference 12-2) is presented as an example in Subsection 1204.

1 January 1952

Two-Dimensional Binary Applications

1204.1-1

1204 Applications of Determinantal Equation for Two-Dimensional Binary Flutter

1204.0 Discussion

The determinantal equation for two-dimensional binary flutter (cf. Equation 1202-9) is

$$\begin{vmatrix} M_{11} + A_{11} & M_{12} + A_{12} \\ M_{21} + A_{21} & M_{22} + A_{22} \end{vmatrix} = 0 \quad (1204.0-1)$$

where, (cf. Equations 1202-7 and 1202-10):

$$M_{11} = \frac{m}{\pi \rho b^2} \left[\left(\frac{\omega_h}{\omega} \right)^2 (1 + ig_h) - 1 \right]$$

$$M_{12} = M_{21} = - \frac{mx \alpha}{\pi \rho b^2}$$

$$M_{22} = \frac{I' \alpha}{\pi \rho b^4} \left[\left(\frac{\omega \alpha}{\omega} \right)^2 (1 + ig_\alpha) - 1 \right] \quad (1204.0-2)$$

$$A_{11} = - C_{Lh}$$

$$A_{12} = C_{Lh} \left(\frac{1}{2} + r \right) - C_{La}$$

$$A_{21} = C_{Lh} \left(\frac{1}{2} + r \right) - C_{Mh}$$

$$A_{22} = - C_{Ma} - C_{Lh} \left(\frac{1}{2} + r \right)^2 + (C_{La} + C_{Mh}) \left(\frac{1}{2} + r \right)$$

A number of fairly simple solutions to the foregoing determinantal equation have been obtained, and one of these is outlined in the following subsection.

1204.1 Materiel Center Method (References 12-2 and 12-16)

Let $g_\alpha = g_h = g$

$$z = \left(\frac{\omega \alpha}{\omega} \right)^2 \quad (1204.1-1)$$

$$\Lambda = Z(1 + ig)$$

$$\text{and } k_{h\alpha} = \left(\frac{\omega_h}{\omega_\alpha} \right)^2$$

$$\text{Then } M_{11} = \frac{m}{\pi \rho b^2} \left(k_{h\alpha} \Lambda - 1 \right) \quad (1204.1-2)$$

$$M_{22} = \frac{I' \alpha}{\pi \rho b^4} \left(\Lambda - 1 \right)$$

The determinantal equation may therefore be written

$$\Lambda^2 + C_1 \Lambda + C_2 = 0 \quad (1204.1-3)$$

where C_1 and C_2 are complex constants.

The two complex roots of this quadratic equation are given by

$$\Lambda = \frac{-C_1 \pm \sqrt{C_1^2 - 4C_2}}{2} \quad (1204.1-4)$$

By complex algebra it is readily shown that

$$\sqrt{C_1^2 - 4C_2} = \sqrt[4]{\xi^2 + \eta^2} \left(\cos \frac{\theta}{2} + i \sin \frac{\theta}{2} \right) \quad (1204.1-5)$$

where

$$\xi = \sqrt{C_1^2 - 4C_2}$$

$$\eta = (C_1^2 - 4C_2)^*$$

$$\theta = \text{arc tan } \frac{\eta}{\xi}$$

Hence we may write the real and complex parts of the two roots of Equation 1204.1-4 as follows:

$$\begin{aligned} 2\bar{\Lambda}_1 &= -\bar{C}_1 + \sqrt[4]{\xi^2 + \eta^2} \cos \frac{\theta}{2} \\ 2\bar{\Lambda}_2 &= -\bar{C}_1 - \sqrt[4]{\xi^2 + \eta^2} \cos \frac{\theta}{2} \\ 2\Lambda_1^* &= -C_1^* + \sqrt[4]{\xi^2 + \eta^2} \sin \frac{\theta}{2} \\ 2\Lambda_2^* &= -C_1^* - \sqrt[4]{\xi^2 + \eta^2} \sin \frac{\theta}{2} \end{aligned} \quad (1204.1-6)$$

By the definitions of Equations 1204.1-1 it is apparent that

$$\left(\frac{\omega_{\alpha 1}}{\omega} \right)^2 = \bar{\Lambda}_1 \quad (1204.1-7)$$

$$\left(\frac{\omega_{\alpha 2}}{\omega} \right)^2 = \bar{\Lambda}_2$$

and since ω must be assumed in order for values of the aerodynamic coefficients to be chosen, then the values of ω_{α} are determined for this value of ω and for the simultaneously assumed value of Mach number M .

It is also apparent by the definitions of Equations 1204.1-1 that the damping coefficients are:

$$g_1 = \frac{\Lambda_1^*}{\bar{\Lambda}_1} \quad (1204.1-8)$$

$$g_2 = \frac{\Lambda_2^*}{\bar{\Lambda}_2}$$

Thus, the procedure for determining the stability of the wing at a given Mach number consists of:

(a) Assuming a series of values for the reduced frequency k , thereby determining the values of the frequency parameter Ω and of the aerodynamic coefficients which will be used in the determinantal equation; then, using these coefficients in solving the determinantal equation for the natural frequency in torsion and for the damping factor.

(b) Plotting these computed damping factors against some convenient parameter such as ω_α or $\omega_\alpha b/a$.

(c) Determining experimentally, or estimating from experience, the actual damping factors of the wing; and plotting this factor on the graph referred to in (b).

If, at a particular value of Mach number and natural frequency ω_α' , the actual damping factor of the wing is greater than the computed value (i.e., if the point representing the experimental value lies above the curve representing the computed values) then freedom from flutter is indicated.

1204.11 Numerical Example by the Material Center Method

Let the following values be assumed to define the characteristics of a two-dimensional wing that is to be examined for binary flutter:

$$\frac{m}{\pi \rho b^2} = 100.0$$

$$\frac{I'_\alpha}{\pi \rho b^4} = 16.67$$

$$\frac{\omega_h}{\omega_\alpha} = 0.700 \quad (1204.11-1)$$

$$r = 0$$

$$x_\alpha = 0$$

These values, when substituted in the M-terms (Equations 1204.0-2) of the determinantal equation give:

$$M_{11} = 100.0 (0.4900 \Lambda - 1)$$

$$M_{12} = M_{21} = 0 \quad (1204.11-2)$$

$$M_{22} = 16.67 (\Lambda-1)$$

2.0

Let the flight Mach number (M) of interest be 1.4, and let the frequency range of interest be defined by a range from 0.2 to 0.7 for the frequency parameter Ω . For this immediate part of the numerical example the value 0.4 is chosen for the latter quantity.

That is

$$\begin{aligned} M &= 1.4 \\ \Omega &= 0.4 \end{aligned} \quad (1204.11-3)$$

These two values determine the aerodynamic coefficients (as tabulated in Table 1208.2) to be:

$$\begin{aligned} C_{Lh} &= -1.31345 - i 12.999891 \\ C_{L\alpha} &= -132.93679 + i 6.776163 \\ C_{Mh} &= -1.08389 - i 6.367874 \\ C_{M\alpha} &= -65.34705 + i 3.340791 \end{aligned} \quad (1204.11-4)$$

For $r = 0$ and for these coefficients, the A-terms (Equation 1204.0-2) of the determinantal equation become:

$$\begin{aligned} A_{11} &= 1.313 + i 13.000 \\ A_{12} &= 132.280 - i 13.276 \\ A_{21} &= 0.427 - i 0.132 \\ A_{22} &= -1.335 + i 0.113 \end{aligned} \quad (1204.11-5)$$

Substituting these values for the M-terms (Equation 1204.11-2) and the A-terms (Equations 1204.11-5) into the determinantal equation 1204.0-1, we get:

$$\left| \begin{array}{cc} 49.00 \Lambda - 98.69 + i 13.00 & 132.28 - i 13.28 \\ 0.4272 - i 0.1321 & 16.67 \Lambda - 18.00 + i 0.1133 \end{array} \right| = 0 \quad (1204.11-6)$$

This equation when expanded and simplified gives

$$\Lambda^2 + (-3.094 + i 0.2721) \Lambda + (2.106 - i 0.2719) = 0 \quad (1204.11-7)$$

By comparison of this equation with Equation 1204.1-3 it is apparent that the complex constants are:

$$\begin{aligned} C_1 &= -3.094 + i 0.2721 \\ C_2 &= 2.106 - i 0.2719 \end{aligned} \quad (1204.11-8)$$

The quantities that appear in the roots of the determinantal equation can be calculated by Equations 1204.1-5 as follows:

$$\begin{aligned}
 c_1^2 &= 9.4994 - i 1.6838 \\
 4 c_2 &= 8.4258 - i 1.0876 \\
 c_1^2 - 4 c_2 &= 1.0735 - i 0.5962 \\
 \zeta &= 1.0735 \\
 \eta &= -0.5962 \\
 \sqrt[4]{\zeta^2 + \eta^2} &= 1.1081 \\
 \theta &= -29^\circ 27' 4''
 \end{aligned} \tag{1204.11-9}$$

The real and imaginary parts of the two roots of the quadratic equation are therefore, by use of Equations 1204.1-6:

$$\begin{aligned}
 \bar{\Lambda}_1 &= 2.083 \\
 \bar{\Lambda}_2 &= 1.011 \\
 \Lambda_1^* &= -0.2750 \\
 \Lambda_2^* &= 0.0029
 \end{aligned} \tag{1204.11-10}$$

By Equations 1204.1-7 it is apparent that the natural frequencies of the wings (ω_α) in relation to the circular frequency (ω) corresponding to the specified Mach number and frequency parameter are given by:

$$\begin{aligned}
 \frac{\omega_{\alpha 1}}{\omega} &= 1.443 \\
 \frac{\omega_{\alpha 2}}{\omega} &= 1.005
 \end{aligned} \tag{1204.11-11}$$

A convenient non-dimensional parameter for the natural frequency is $\omega_\alpha b/a$; this can be derived from the foregoing ratio by the identity

$$\frac{\omega_\alpha b}{a} = \frac{\omega_\alpha}{\omega} \cdot \frac{\omega b}{V} \cdot \frac{V}{a}$$

where $\omega b/V$ (the reduced frequency k) is related to Mach number M and frequency parameter Ω as indicated in the list of symbols and in Table 1208.1.

For this numerical example we therefore find that

$$\begin{aligned}
 \frac{\omega b}{V} &= 0.09796 \\
 \frac{V}{a} &= 1.4
 \end{aligned} \tag{1204.11-12}$$

and

Therefore,

$$\frac{\omega_{\alpha 1}^b}{a} = 0.1980 \quad (1204.11-13)$$

$$\frac{\omega_{\alpha 2}^b}{a} = 0.1379$$

By Equations 1204.1-8 it is apparent that the damping coefficients corresponding to the two roots of the flutter equation are:

$$\begin{aligned} g_1 &= -0.1320 \\ g_2 &= +0.0029 \end{aligned} \quad (1204.11-14)$$

Similar computations of ω_{α}^b/a (the reduced natural frequency k_{α}), and of g , have been computed for $\Omega = 0.2, 0.25, 0.3, 0.5, 0.6, 0.7, \text{ and } 1.0$ and then all of these values have been plotted (g vs k_{α}) in Figure 1204.11-1, for Mach number 1.4. In an actual investigation of the flutter characteristics of a wing similar computations and graphs would be computed for each of several other Mach numbers.

The actual value of the quantity k_{α} for the sample wing may be determined by experiment or estimated from experience. In the former case the natural frequency in torsion of the wing (ω_{α} in radians per second) would be measured, and also an average or effective semi-chord length of the wing would be determined. In addition, for each altitude of interest a value for the velocity of sound would be determined corresponding to the ambient temperature and composition of the air at that level.

Likewise the actual value of the damping factor of the wing in torsion would be determined by measuring the rate of decay of a damped torsional vibration of the wing structure, or by measuring the power required to sustain such a vibration at constant amplitude - or an estimate could be made of the torsional damping factor from past experiences. A similar determination would be made of the flexural damping factor of the wing structure, and both of these damping factors would be used in selecting a suitable common damping factor for the wing being considered.

The point representing the value of the damping factor (g) and of the non-dimensional parameter for the reduced natural frequency (k_{α}) of the wing at a given altitude would then be plotted on the previously computed graphs such as represented in Figure 1204.11-1 for each Mach number of interest. If the point for the experimental quantities lies above both curves representing the two roots of the equation it is concluded that flutter is improbable. For example, if the quantity k_{α} for the wing at sea level is 0.2527 and the smaller of the two damping factors is 0.0032 it is seen that the point representing this wing on the graph of Figure 1204.11-1, for $M = 1.4$ lies above both curves and therefore the wing appears to be free from flutter at this Mach number. Similar spotting of the experimental values on the graphs for other Mach numbers would be made to determine the possibility of flutter occurring at each of these Mach numbers.

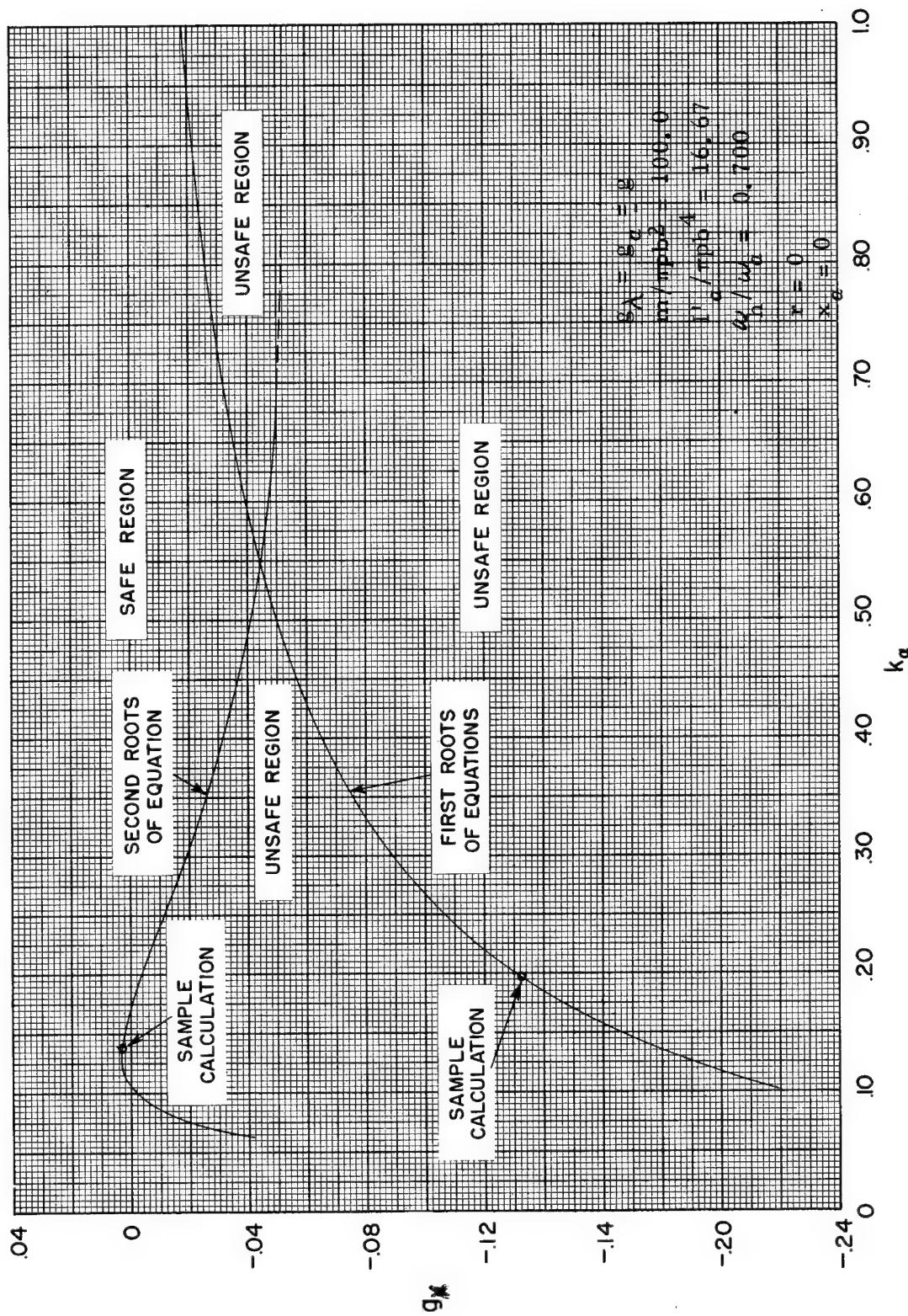


Figure 1204.11-1 ROOTS OF EQUATIONS DETERMINING STABILITY BOUNDARY FOR BINARY FLEXURE-TORSION FLUTTER. MATERIAL CENTER METHOD. $M = 1.4$

1205

Three-Dimensional Ternary Flexure-Flexure-Torsion Flutter
(References 12-12 and 12-13)

In many cases of three-dimensional systems it will be found that the natural frequency in bending in the second mode may be nearly equal to the natural frequency in torsion. If this is found to be true, then it may be expected that the second bending mode will affect the flutter characteristics. In order to include the effects of the additional bending mode, let:

$$h = h_1 + h_2$$

$$h_1 = \phi_1(y)q_1(t) = \phi_1 h_{10} e^{i\omega t}$$

$$h_2 = \phi_2(y)q_2(t) = \phi_2 h_{20} e^{i\omega t} \quad (1205-1)$$

$$\alpha = \phi_3(y)q_3(t) = \phi_3 \alpha_0 e^{i\omega t}$$

The process of determining the kinetic and elastic energies of the system, taking appropriate derivatives and substituting in the Lagrangian equations of motion, can be followed as in Subsection 1203. If this is done, the condition that the equations of motion have a solution will be

$$\begin{vmatrix} M''_{11} + A''_{11} & M''_{12} + A''_{12} & M''_{13} + A''_{13} \\ M''_{21} + A''_{21} & M''_{22} + A''_{22} & M''_{23} + A''_{23} \\ M''_{31} + A''_{31} & M''_{32} + A''_{32} & M''_{33} + A''_{33} \end{vmatrix} = 0 \quad (1205-2)$$

where

$$M''_{11} = \int_0^l m \phi_{11}^2 \left[\left(\frac{\omega_{h1}}{\omega} \right)^2 (1 + i g_{h1}) - 1 \right] dy$$

$$M''_{12} = M''_{21} = - \int_0^l m \phi_{11} \phi_{21} dy = 0 \quad (\text{by orthogonality})$$

$$M''_{13} = M''_{31} = - \int_0^l S \phi_{11} \phi_{31} dy \quad (1205-3)$$

$$M''_{22} = \int_0^l m \phi_{22}^2 \left[\left(\frac{\omega_{h2}}{\omega} \right)^2 (1 + i g_{h2}) - 1 \right] dy$$

$$M''_{23} = M''_{32} = - \int_0^l S \phi_{22} \phi_{32} dy$$

$$M''_{33} = \int_0^l I \alpha \phi_{33}^2 \left[\left(\frac{\omega_\alpha}{\omega} \right)^2 (1 + i g_\alpha) - 1 \right] dy$$

$$\begin{aligned} A''_{11} &= \pi \rho \int_0^l b^2 A_{11} \phi_1^2 dy \\ A''_{12} &= A''_{21} = \pi \rho \int_0^l b^2 A_{11} \phi_1 \phi_2 dy \\ A''_{13} &= \pi \rho \int_0^l b^3 A_{12} \phi_1 \phi_2 dy \\ A''_{22} &= \pi \rho \int_0^l b^2 A_{11} \phi_2^2 dy \quad (1205-4) \\ A''_{23} &= \pi \rho \int_0^l b^3 A_{12} \phi_2 \phi_3 dy \\ A''_{31} &= \pi \rho \int_0^l b^3 A_{21} \phi_1 \phi_3 dy \\ A''_{32} &= \pi \rho \int_0^l b^3 A_{21} \phi_2 \phi_3 dy \\ A''_{33} &= \pi \rho \int_0^l b^4 A_{22} \phi_3^2 dy \end{aligned}$$

The values of the unprimed A_{11} , A_{12} , A_{21} , A_{22} are the same as in Subsection 1202 (Equation 1202-7). The method of solving Equation 1205-2 will be discussed in Subsection 1207. An application of this general method to subsonic flutter is given in References 12-12 and 12-13.

1206

Two-Dimensional Ternary Flexure-Torsion-Aileron Flutter

The determinantal equation for two-dimensional ternary bending-torsion-aileron flutter may be written, corresponding to that for binary flutter (Equation 1202-9), as

$$\begin{vmatrix} M_{11} + A_{11} & M_{12} + A_{12} & M_{13} + A_{13} \\ M_{21} + A_{21} & M_{22} + A_{22} & M_{23} + A_{23} \\ M_{31} + A_{31} & M_{32} + A_{32} & M_{33} + A_{33} \end{vmatrix} = 0 \quad (1206-1)$$

where M_{11}, \dots, M_{22} and A_{11}, \dots, A_{22} are exactly as defined in Subsection 1202. These are repeated here for convenience. In addition, the forces and moments about the elastic axis due to the motion of the aileron, and the moments about the aileron hinge line also are given here. Thus,

$$\begin{aligned} M_{11} &= \frac{m}{\pi \rho b^2} \left[\left(\frac{\omega_h}{\omega} \right)^2 (1 + ig_h) - 1 \right] \\ M_{12} &= M_{21} = - \frac{mx_\alpha}{\pi \rho b^2} \\ M_{22} &= \frac{I_\alpha}{\pi \rho b^4} \left[\left(\frac{\omega_\alpha}{\omega} \right)^2 (1 + ig_\alpha) - 1 \right] \quad (1206-2) \\ M_{13} &= M_{31} = - \frac{m_\beta x_\beta}{\pi \rho b^2} \\ M_{23} &= M_{32} = - \frac{I_\beta}{\pi \rho b^4} - \frac{m_\beta}{\pi \rho b^2} (c - r) x_\beta \\ M_{33} &= \frac{I_\beta}{\pi \rho b^4} \left[\left(\frac{\omega_\beta}{\omega} \right)^2 (1 + ig_\beta) - 1 \right] \end{aligned}$$

The aerodynamic coefficients not involving the aileron are identically as given in Equations 1202-7, that is:

$$\begin{aligned} A_{11} &= - C_{Lh} \\ A_{12} &= C_{Lh} \left(\frac{1}{2} + r \right) - C_{L\alpha} \quad (1206-3) \\ A_{21} &= C_{Lh} \left(\frac{1}{2} + r \right) - C_{Mh} \\ A_{22} &= - C_{M\alpha} - C_{Lh} \left(\frac{1}{2} + r \right)^2 + (C_{L\alpha} + C_{Mh}) \left(\frac{1}{2} + r \right) \end{aligned}$$

The aerodynamic terms involving the aileron are:

$$A_{13} = - \left(\frac{1-c}{2} \right)^3 \left(\frac{1}{2} C'_{Lh} + C'_{L\alpha} \right)$$

$$A_{23} = - \left(\frac{1-c}{2} \right)^4 \left[C'_{M\alpha} + C'_{Lh} \left(\frac{c-r}{1-c} + \frac{1}{4} \right) + C'_{L\alpha} \left(2 \frac{c-r}{1-c} + \frac{1}{2} \right) + \frac{1}{2} C'_{Mh} \right]$$

$$A_{31} = C_{Lh} \left(\frac{1}{2} + c \right) - C_{Mh} - \left(\frac{1+c}{2} \right)^{\frac{3}{2}} \left(\frac{3}{2} C''_{Lh} - C''_{Mh} \right) \quad (1206-4)$$

$$A_{32} = - C_{M\alpha} - C_{Lh} \left(\frac{1}{2} + r \right) \left(\frac{1}{2} + c \right) + C_{L\alpha} \left(\frac{1}{2} + c \right) + C_{Mh} \left(\frac{1}{2} + r \right)$$

$$- \left(\frac{1+c}{2} \right)^4 \left[- C''_{M\alpha} - \frac{3}{2} C''_{Lh} \left(2 \frac{r+1}{c+1} - \frac{1}{2} \right) + C''_{L\alpha} \left(2 \frac{r+1}{c+1} - \frac{1}{2} \right) + \frac{3}{2} C''_{Mh} \right]$$

$$A_{33} = - \left(\frac{1-c}{2} \right)^4 \left(C'_{M\alpha} + \frac{1}{4} C'_{Lh} + \frac{1}{2} C'_{L\alpha} + \frac{1}{2} C'_{Mh} \right)$$

All of the aerodynamic flutter coefficients (i.e., all of the C , C' and C'' coefficients) are obtained from Table 1208-2, in which values of the coefficients are tabulated with Mach number (M) and the frequency parameter (Ω) as independent parameters, where the latter is a function of M , V , ω , and b (see the symbols list). In the case of the C -coefficients, b is the semi-chord of the entire wing; for the C' -coefficients, b is the semi-chord of the aileron; and for the C'' -coefficients, b is the semi-chord of that portion of the wing forward of the aileron. For any given wing-aileron combination it is assumed for flutter analyses that the circular frequency ω is the same for all primed or unprimed C -coefficients.

It should be noted that if the aileron flutter alone (with no wing-torsion or bending) is being investigated, the two families of curves in Figures 1201-4 and 1201-5 apply, if the aileron is assumed to be hinged at the leading edge (i.e., $r = -1.0$).

**1207 Solution of Higher Order (above second order) Determinantal
Flutter Equations**

If, in the ternary flutter determinantal equations of motion (e.g., Equations 1205-2 and 1206-1), it is assumed that the frequencies bear a fixed ratio to each other, and that structural damping factors are equal, we may write:

$$\begin{aligned} z &= \left(\frac{\omega_\alpha}{\omega}\right)^2 \\ g &= g_h = g_\alpha = g_\beta \quad (1207-1) \\ \Lambda &= Z(1 + ig) \end{aligned}$$

It is then found that the ternary determinantal equations may be put in the form of a third degree polynomial such as

$$\Delta_0 \Lambda^3 + \Delta_1 \Lambda^2 + \Delta_2 \Lambda + \Delta_3 = 0 \quad (1207-2)$$

Since, in supersonic flutter analyses it is necessary to solve the determinantal equation for each Mach number of interest, it is obvious that considerable computational work is required. Three methods of solving these higher-order flutter equations (including quadric as well as cubic equations) have been investigated by Ruggiero and recorded in Reference 12-17.

As an alternative to solving the cubic equation, one may assume that the bending and aileron frequencies are fixed quantities instead of being in fixed ratios with the torsional frequency. Then, on expanding the determinant, the stability equation will be linear in Λ and the torsional frequency may be found directly. After plotting ω_α and g_α versus $1/k$ or some other parameter, it will be found that at some value of k the calculated ω_α will be the same as the actual natural frequency. Thus, the torsional damping factor found at that value of k will determine the stability of the system.

Other modifications of the method may be made, for instance: (1) assume the aileron natural frequency known, and the value of k_α known, and then solve the resulting quadratic in Λ ; (2) assume that the damping is zero, the aileron natural frequency known, and then solve for Z and k_α . These methods may also be applied in principle to the binary equations discussed in Subsection 1204.

1 January 1952

Reduced Frequency

1208.1-1

1208 Tables

1208.1 Reduced Frequency (k); Mach Number (M) and Frequency
Parameter (Ω) Independent

$\Omega \setminus M$	1.1	1.2	1.3	1.4	1.5	1.6
.01	.0008678	.001528	.002041	.002449	.002778	.003047
.02	.001736	.003056	.004083	.004898	.005566	.006094
.03	.002633	.004583	.006124	.007347	.008333	.009141
.04	.003411	.006111	.008106	.009736	.011111	.01219
.06	.005297	.009167	.01225	.01469	.01667	.01828
.08	.006942	.01222	.01633	.01959	.02222	.02438
.10	.008678	.01528	.02041	.02447	.02778	.03047
.15	.01302	.02292	.03062	.03673	.04167	.04570
.20	.01736	.03056	.04083	.04898	.05556	.06094
.25	.02169	.03819	.05104	.06122	.06944	.07617
.30	.02603	.04583	.06124	.07347	.08333	.09141
.35	.03037	.05347	.07145	.08571	.09722	.1066
.40	.03471	.06111	.08166	.09796	.11111	.1219
.50	.04339	.07639	.1021	.1224	.1389	.1523
.60	.05207	.09167	.1225	.1469	.1667	.1828
.70	.06074	.1069	.1429	.1714	.1944	.2133
.80	.06942	.1222	.1633	.1959	.2222	.2438
.90	.07810	.1375	.1837	.2204	.2500	.2742
1.0	.08678	.1528	.2041	.2449	.2778	.3047
1.2	.1041	.1833	.2450	.2939	.3333	.3656
1.4	.1215	.2139	.2858	.3429	.3889	.4266
1.6	.1388	.2444	.3266	.3918	.4444	.4875
1.8	.1562	.2750	.3675	.4408	.5000	.5484
2.0	.1736	.3056	.4083	.4898	.5556	.6094
2.2	.1909	.3361	.4491	.5388	.6111	.6703
2.4	.2083	.3667	.4899	.5878	.6667	.7313
2.6	.2256	.3972	.5308	.6367	.7222	.7922
2.8	.2430	.4278	.5716	.6857	.7778	.8531
3.0	.2603	.4583	.6124	.7347	.8333	.9141
3.5	.3037	.5347	.7145	.8571	.9722	1.0664
4.0	.3471	.6111	.8166	.9796	1.1111	1.2188
4.5	.3905	.6875	.9186	1.1020	1.2500	1.3711
5.0	.4339	.7639	1.207	1.2445	1.3889	1.5234
7.5	.6508	1.1458	1.5311	1.8367	2.0833	2.2852
10.0	.8678	1.5278	2.0414	2.4490	2.7778	3.0469
15.0	1.3017	2.2917	3.0621	3.6735	4.1667	4.5703
20.0	1.7355	3.0556	4.0828	4.8980	5.5556	6.0938

Table 1208.1 REDUCED FREQUENCY (k); MACH NUMBER (M) AND FREQUENCY PARAMETER (Ω) INDEPENDENT

$\Omega \backslash M$	1.7	1.8	1.9	2.0	2.2	2.4
.01	.003270	.003457	.003615	.003750	.003967	.004132
.02	.006340	.006914	.007230	.007500	.007934	.008264
.03	.01037	.01084	.01125	.01190	.01240	.01240
.04	.01388	.01446	.01500	.01587	.01653	.01653
.06	.01962	.02074	.02169	.02250	.02380	.02479
.08	.02616	.02765	.02892	.03000	.03174	.03306
.10	.03270	.03457	.03615	.03750	.03967	.04132
.15	.04905	.05185	.05322	.05525	.05950	.06398
.20	.06540	.06914	.07230	.07500	.07934	.08364
.25	.08175	.08642	.09037	.09375	.09917	.10333
.30	.09810	.1037	.1084	.1125	.1190	.1240
.35	.1144	.1210	.1285	.1312	.1388	.1446
.40	.1308	.1383	.1446	.1500	.1587	.1653
.50	.1635	.1728	.1807	.1875	.1983	.2086
.60	.1982	.2074	.2169	.2250	.2380	.2479
.70	.2289	.2420	.2530	.2625	.2777	.2892
.80	.2616	.2765	.2892	.3000	.3174	.3306
.90	.2943	.3111	.3253	.3375	.3570	.3719
1.0	.3270	.3457	.3615	.3750	.3967	.4132
1.2	.3924	.4148	.4338	.4500	.4760	.4958
1.4	.4578	.4840	.5061	.5250	.5554	.5785
1.6	.5232	.5531	.5784	.6000	.6347	.6611
1.8	.5886	.6222	.6507	.6750	.7140	.7437
2.0	.6540	.6914	.7230	.7500	.7934	.8264
2.2	.7194	.7605	.7953	.8250	.8727	.9090
2.4	.7848	.8296	.8676	.9000	.9521	.9917
2.6	.8502	.8988	.9399	.9750	1.0314	1.0743
2.8	.9156	.9679	1.0122	1.0500	1.1107	1.1589
3.0	.9810	1.0370	1.0845	1.1250	1.1901	1.2396
3.5	1.1445	1.2099	1.2652	1.3125	1.3864	1.4462
4.0	1.3080	1.3827	1.4460	1.5000	1.5868	1.6558
4.5	1.4715	1.5556	1.6267	1.6875	1.7851	1.8594
5.0	1.6350	1.7284	1.8075	1.8750	1.9835	2.0660
7.5	2.4524	2.5926	2.7112	2.8125	2.9752	3.0990
10.0	3.2699	3.4568	3.6150	3.7500	3.8869	4.1319
15.0	4.9048	5.1852	5.4224	5.6250	5.9504	6.1979
20.0	6.5398	6.9136	7.2299	7.5000	7.9339	8.2639

Table 1208.1 REDUCED FREQUENCY (k) ; MACH NUMBER (M)
AND FREQUENCY PARAMETER (Ω) INDEPENDENT
(Continued)

Ω	M	2.6'	2.8	3.0	3.2	3.4	3.6
.01	.004260	.004362	.004444	.004512	.004567	.004614	
.02	.00521	.008724	.008889	.009023	.009135	.009228	
.03	.01278	.01309	.01333	.01354	.01370	.01384	
.04	.01704	.01745	.01778	.01805	.01827	.01846	
.06	.02556	.02617	.02667	.02707	.02740	.02769	
.08	.03408	.03490	.03556	.03609	.03654	.03691	
.10	.04280	.04362	.04444	.04512	.04567	.04614	
.15	.06391	.06543	.06687	.06768	.06851	.06921	
.20	.08521	.08724	.08889	.08923	.0935	.09228	
.25	.1065	.1091	.1111	.1128	.1142	.1154	
.30	.1278	.1309	.1333	.1354	.1370	.1384	
.35	.1491	.1527	.1556	.1579	.1599	.1615	
.40	.1704	.1745	.1778	.1805	.1827	.1846	
.50	.2130	.2181	.2222	.2256	.2284	.2307	
.60	.2556	.2617	.2667	.2707	.2740	.2769	
.70	.2982	.3054	.3111	.3158	.3197	.3230	
.80	.3408	.3490	.3566	.3609	.3654	.3691	
.90	.3834	.3926	.4000	.4061	.4111	.4153	
1.0	.4260	.4362	.4444	.4512	.4567	.4614	
1.2	.5112	.5235	.5333	.5414	.5481	.5537	
1.4	.5964	.6107	.6222	.6316	.6394	.6460	
1.6	.6817	.6980	.7111	.7219	.7308	.7383	
1.8	.7669	.7852	.8000	.8121	.8221	.8306	
2.0	.8521	.8724	.8889	.9023	.9135	.9228	
2.2	.9373	.9597	.9778	.9926	1.0048	1.0151	
2.4	1.0225	1.0469	1.0667	1.0828	1.0962	1.1074	
2.6	1.1077	1.1342	1.1556	1.1730	1.1875	1.1997	
2.8	1.1929	1.2214	1.2444	1.2633	1.2789	1.2920	
3.0	1.2781	1.3087	1.3333	1.3535	1.3702	1.3843	
3.5	1.4911	1.5268	1.5556	1.5791	1.5986	1.6150	
4.0	1.7041	1.7449	1.7778	1.8047	1.8270	1.8457	
4.5	1.9172	1.9630	2.0000	2.0303	2.0554	2.0764	
5.0	2.1302	2.1811	2.2222	2.2559	2.2837	2.3071	
7.5	3.1953	3.2717	3.3333	3.3838	3.4256	3.4606	
10.0	4.2604	4.3622	4.4444	4.5117	4.5675	4.6142	
15.0	6.3905	6.5434	6.6667	6.7676	6.8512	6.9213	
20.0	8.5207	8.7245	8.8889	9.0234	9.1349	9.2284	

Table 1208.1 REDUCED FREQUENCY (k); MACH NUMBER (M)
AND FREQUENCY PARAMETER (Ω) INDEPENDENT
(Continued)

$\Omega \setminus k$	3.8	4.0	4.5	5.0	6.0	7.0
.01	.004654	.004688	.004753	.004800	.004861	.004898
.02	.009307	.009375	.009506	.009600	.009722	.009796
.03	.01396	.01406	.01426	.01440	.01458	.01469
.04	.01861	.01875	.01901	.01920	.01944	.01959
.06	.02792	.02812	.02852	.02880	.02917	.02939
.08	.03723	.03750	.03802	.03840	.03889	.03918
.10	.04654	.04688	.04753	.04800	.04861	.04898
.15	.06981	.07031	.07130	.07200	.07292	.07347
.20	.09307	.09375	.09506	.09600	.09722	.09796
.25	.1163	.1172	.1188	.1200	.1215	.1224
.30	.1396	.1406	.1426	.1440	.1458	.1469
.35	.1629	.1641	.1664	.1680	.1701	.1714
.40	.1861	.1875	.1901	.1920	.1944	.1959
.50	.2327	.2344	.2377	.2400	.2431	.2449
.60	.2792	.2812	.2852	.2880	.2917	.2939
.70	.3258	.3281	.3327	.3360	.3403	.3429
.80	.3723	.3750	.3802	.3840	.3889	.3918
.90	.4188	.4219	.4278	.4320	.4375	.4408
1.0	.4654	.4688	.4753	.4800	.4861	.4898
1.2	.5584	.5625	.5704	.5760	.5833	.5878
1.4	.6515	.6562	.6654	.6720	.6806	.6857
1.6	.7446	.7500	.7605	.7680	.7778	.7837
1.8	.8377	.8438	.8556	.8640	.8750	.8816
2.0	.9307	.9375	.9506	.9600	.9722	.9796
2.2	1.0238	1.0312	1.0457	1.0560	1.0694	1.0776
2.4	1.1169	1.1250	1.1407	1.1520	1.1667	1.1756
2.6	1.2100	1.2188	1.2358	1.2480	1.2639	1.2735
2.8	1.3030	1.3125	1.3309	1.3440	1.3611	1.3714
3.0	1.3961	1.4062	1.4259	1.4400	1.4583	1.4694
3.5	1.6288	1.6406	1.6636	1.6800	1.7014	1.7143
4.0	1.8615	1.8750	1.9012	1.9200	1.9444	1.9592
4.5	2.0942	2.1094	2.1389	2.1600	2.1875	2.2041
5.0	2.3269	2.3438	2.3765	2.4000	2.4306	2.4490
7.5	3.4903	3.5156	3.5648	3.6000	3.6458	3.6735
10.0	4.6537	4.6875	4.7531	4.8000	4.8611	4.8980
15.0	6.9806	7.0312	7.1296	7.2000	7.2917	7.3469
20.0	9.3075	9.3750	9.5062	9.6000	9.7222	9.7959

Table 1208.1 REDUCED FREQUENCY (k); MACH NUMBER (M)
AND FREQUENCY PARAMETER (Ω) INDEPENDENT
(Continued)

$\Omega \backslash M$	8.0	9.0	10.0	11.0	12.0
.01	.004922	.004938	.004950	.004959	.004965
.02	.009844	.009877	.009900	.009917	.009931
.03	.01477	.01481	.01485	.01488	.01490
.04	.01969	.01975	.01980	.01983	.01986
.06	.02953	.02963	.02970	.02975	.02979
.08	.03938	.03951	.03960	.03967	.03972
.10	.04922	.04938	.04950	.04959	.04965
.15	.07383	.07407	.07425	.07438	.07448
.20	.09844	.09877	.09900	.09917	.09931
.25	.1230	.1235	.1238	.1240	.1241
.30	.1477	.1481	.1485	.1488	.1490
.35	.1723	.1728	.1732	.1736	.1738
.40	.1969	.1975	.1980	.1983	.1986
.50	.2461	.2469	.2475	.2479	.2483
.60	.2953	.2963	.2970	.2975	.2979
.70	.3445	.3457	.3465	.3471	.3476
.80	.3938	.3951	.3960	.3967	.3972
.90	.4430	.4444	.4455	.4463	.4469
1.0	.4922	.4938	.4950	.4959	.4965
1.2	.5906	.5926	.5940	.5950	.5958
1.4	.6891	.6914	.6930	.6942	.6951
1.6	.7875	.7901	.7920	.7934	.7944
1.8	.8859	.8889	.8910	.8926	.8938
2.0	.9844	.9877	.9900	.9917	.9931
2.2	1.0828	1.0864	1.0890	1.0909	1.0924
2.4	1.1812	1.1852	1.1880	1.1901	1.1917
2.6	1.2997	1.2840	1.2870	1.2893	1.2910
2.8	1.381	1.3827	1.3860	1.3884	1.3903
3.0	1.4666	1.4815	1.4850	1.4876	1.4896
3.5	1.7227	1.7284	1.7325	1.7355	1.7378
4.0	1.9688	1.9753	1.9800	1.9835	1.9861
4.5	2.2148	2.2222	2.2275	2.2314	2.2344
5.0	2.4609	2.4691	2.4750	2.4793	2.4826
7.5	3.6914	3.7037	3.7125	3.7190	3.7240
10.0	4.9219	4.9383	4.9500	4.9587	4.9653
15.0	7.3828	7.4074	7.4250	7.4380	7.4479
20.0	9.8438	9.8765	9.9000	9.9174	9.9306

Table 1208.1 REDUCED FREQUENCY (k) ; MACH NUMBER (M)
AND FREQUENCY PARAMETER (Ω) INDEPENDENT
(Concluded)

1208.2

Aerodynamic Force Flutter Coefficient (C_L) and Moment Flutter

Coefficient (C_M); Mach Number (M) and Frequency Parameter (Ω)

Independent

Ω	\bar{C}_{Lh}	$* C_{Lh}$	$\bar{C}_{L\alpha}$	$* C_{L\alpha}$
00 . 01	-13 . 230384	-3201 . 7511	-3689639 . 2	13645 . 534
00 . 02	-13 . 229586	-1600 . 7763	-922354 . 28	6822 . 3069
00 . 03	-13 . 228555	-1067 . 0740	-409894 . 12	4547 . 6937
00 . 04	-13 . 226393	-800 . 18976	-230533 . 07	3410 . 2338
00 . 06	-13 . 221075	-533 . 23948	-102418 . 04	2272 . 4677
00 . 08	-13 . 213632	-399 . 69839	-57577 . 08	1703 . 2787
00 . 10	-13 . 204068	-319 . 52109	-36823 . 209	1361 . 5210
00 . 15	-13 . 170914	-212 . 46519	-16324 . 934	905 . 13392
00 . 20	-13 . 124631	-158 . 77492	-150 . 6754	676 . 18448
00 . 25	-13 . 065353	-126 . 43275	-5830 . 1692	538 . 21654
00 . 30	-12 . 993252	-104 . 76660	-4026 . 5964	445 . 74623
00 . 35	-12 . 908534	-89 . 20308	-2939 . 2635	379 . 28172
00 . 40	-12 . 811441	-77 . 45580	-233 . 2170	329 . 07816
00 . 50	-12 . 581274	-60 . 838321	-1404 . 4467	257 . 96834
00 . 60	-12 . 305362	-49 . 582397	-954 . 59078	209 . 69018
00 . 70	-11 . 986806	-41 . 405253	-683 . 96024	174 . 51211
00 . 80	-11 . 629148	-35 . 167211	-508 . 92920	147 . 57487
00 . 90	-11 . 236315	-30 . 236357	-389 . 53998	126 . 18393
01 . 00	-10 . 812550	-26 . 234390	-304 . 74015	108 . 72628
01 . 20	-9 . 8903988	-20 . 136500	-195 . 85981	81 . 858475
01 . 40	-8 . 9004278	-15 . 741986	-132 . 11998	62 . 157454
01 . 60	-7 . 8809733	-12 . 482003	-92 . 486217	47 . 218434
01 . 80	-6 . 8687429	-8 . 033138	-66 . 841928	35 . 692177
02 . 00	-5 . 8968061	-8 . 191282	-49 . 803563	26 . 745091
02 . 20	-4 . 929471	-6 . 815255	-38 . 274943	19 . 816011
02 . 40	-4 . 1784821	-5 . 7996530	-30 . 364694	14 . 497171
02 . 60	-3 . 4676029	-5 . 0612090	-24 . 863161	10 . 4472482
02 . 80	-2 . 86772627	-4 . 5318519	-20 . 970915	7 . 4852195
03 . 00	-2 . 3775735	-4 . 1552012	-18 . 148862	5 . 3201039
03 . 50	-1 . 5873002	-3 . 5989150	-13 . 654828	2 . 3705961
04 . 00	-1 . 2441897	-3 . 2394224	-10 . 755628	1 . 3358581
04 . 50	-1 . 1042605	-2 . 8701682	-8 . 4652057	. 94062682
05 . 00	-1 . 98667714	-2 . 4774957	-6 . 6211552	. 60910356
07 . 50	-32115086	-1 . 5557492	-2 . 8987917	-44170386
10 . 00	-1237239	-1 . 125767	-1 . 605197	-5143966
15 . 00	-107663	-7881309	-7314905	-3879919
20 . 00	-0303910	-6165438	-4195301	-3064455

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS, Lift, $M = 1.1$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-11.025249	-1600.322025	-18447837	10837563
00.02	-11.024371	-800.32022	-46114123	5418.2808
00.03	-11.022908	-533.43778	-20491115	3611.6306
00.04	-11.020859	-399.96261	-115230163	2708.1387
00.05	-11.015009	-266.42141	-51173.135	1804.3132
00.06				
00.08	-11.006823	-199.58489	-28753037	1352.0673
00.10	-10.996305	-159.43037	-18375762	1080.4538
00.15	-10.959846	-105.73845	-8126713	717.52958
00.20	-10.908967	-78.73067	-45397030	535.24539
00.25	-10.843829	-62.398714	-2879.6049	425.22499
00.30	-10.764640	-51.406958	-1978.0071	351.34478
00.35	-10.671649	-43.469131	-1434.5624	298.12474
00.40	-10.565151	-37.442446	-1082.0406	257.82613
00.50	-10.313020	-28.838257	-668.01234	200.52073
00.60	-10.011405	-22.931509	-443.80998	161.38517
00.70	-9.6640557	-18.583550	-309.33476	132.69655
00.80	-9.2752448	-15.226970	-222.76547	110.60116
00.90	-8.8496963	-12.547901	-164.11401	92.9639417
01.00	-8.3925056	-10.58909	-122.84417	78.508041
01.20	-7.4049179	-7.0157488	-70.881517	56.173731
01.40	-6.3573437	-4.6374155	-41.702516	39.794205
01.60	-5.2948914	-2.9386642	-24.695739	27.466228
01.80	-4.2601334	-1.7508238	-14.710288	18.115399
02.00	-3.2906325	-1.9595377	-8.9679733	11.05399
02.20	-2.4169609	-4.77773352	-5.8444607	5.8182182
02.40	-1.6613287	-2.3343717	-4.3310327	2.0470129
02.60	-1.0369064	-1.6446150	-3.7752052	-5.4990459
02.80	-0.54784694	-2.1643239	-3.7459640	-2.2183030
03.00	-1.8996070	-3.4240359	-3.9587652	-3.1707866
03.50	-2.1803870	-74330013	-4.5231124	-3.5662202
04.00	-1.7881652	-9.9082933	-4.4061296	-2.7457974
04.50	-0.1088480	-98295344	-3.6769270	-1.9295279
05.00	-0.07555973	-81254342	-2.7964271	-1.5435642
07.50	-0.16721982	-62059449	-1.4563338	-1.2655043
10.00	-1.841614	-4687929	-8346054	-9212357
15.00	-1.152396	-3918677	-4037820	-5294715
20.00	-0.946744	-3276093	-2348771	-3839792

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 1.1$

Ω	\bar{C}_{Lh}	C_{Lh}^*	\bar{C}_{La}	C_{La}^*
00.01	-4.3623711	-1256.3656	-822349.15	2227.1765
00.02	-4.3631151	-628.15011	-205577.15	1113.5045
00.03	-4.3616885	-418.73039	-91360.085	742.24323
00.04	-4.3610914	-314.00963	-51384.122	556.58470
00.05	-4.3593855	-209.26710	-22829.865	370.87039
00.06	-4.3539310	-156.87408	-12835.879	277.95750
00.08	-4.3569984	-125.42090	-8210.0959	222.16525
00.10	-4.3539310	-125.42090	-8210.0959	222.16525
00.15	-4.3432957	-63.38533	-3042.43235	147.64621
00.20	-4.3284463	-62.38533	-3042.43235	147.64621
00.25	-4.3094224	-49.714493	-1302.3482	87.701481
00.30	-4.2862751	-41.232633	-900.35570	72.580172
00.35	-4.2590661	-35.1451121	-657.99650	61.703627
00.40	-4.2278679	-30.554700	-500.72632	53.481352
00.50	-4.1538453	-24.071121	-315.86026	41.819354
00.60	-4.0649891	-19.689355	-215.54868	33.885040
00.70	-3.9622298	-16.513319	-155.17534	28.090274
00.80	-3.8466332	-14.095522	-116.10226	23.642160
00.90	-3.7193840	-12.187764	-89.424296	20.101111
01.00	-3.5817679	-10.641413	-70.449967	17.204053
01.20	-3.2809711	-8.2869016	-46.020363	12.730197
01.40	-2.9558142	-6.5875505	-31.637984	9.4362106
01.60	-2.6182053	-5.205783	-22.620336	6.9306983
01.80	-2.2797392	-4.3602803	-12.720089	4.9942693
02.00	-1.9510969	-3.6283906	-12.741310	3.4913816
02.20	-1.6415349	-3.0717807	-9.991087	2.3306152
02.40	-1.3584932	-2.6515900	-8.0756663	1.4452234
02.60	-1.1073445	-2.3376574	-6.7040440	0.78309112
02.80	-8.9129264	-2.1055951	-5.7076406	3.0141271
03.00	-7.1141724	-1.9352429	-4.9668330	-0.3613290
03.50	-4.1033542	-1.6767366	-3.7558400	-0.44435327
04.00	-2.7450741	-1.5224688	-2.9792883	-51.342939
04.50	-2.2737632	-1.3818788	-2.3842118	-4.7679891
05.00	-2.0282627	-1.2333557	-1.9076430	-4.4601913
07.50	-0.00835777	-0.81740877	-0.86346896	-4.1953861
10.00	0.208292	0.6266432	0.4851438	3256125
11.50	0.246040	0.4580355	0.2186748	2120162
20.00	0.106292	0.3535049	0.1172607	1611712

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, M = 1.2

Ω	\bar{C}_{Mh}	C_{Mh}^*	$\bar{C}_{M\alpha}$	$C_{M\alpha}^*$
00 . 01	-3 . 6352865	-628 . 17192	-411168 . 16	1646 . 5687
00 . 02	-3 . 6350049	-314 . 05324	-102782 . 15	823 . 19382
00 . 03	-3 . 6345357	-209 . 33248	-45673 . 632	548 . 69531
00 . 04	-3 . 6338788	-156 . 96120	-25685 . 651	411 . 41591
00 . 05	-3 . 6320025	-104 . 56815	-11408 . 525	274 . 07623
00 . 06				
00 . 08	-3 . 6293769	-78 . 34983	-6411 . 5360	205 . 34618
00 . 10	-3 . 6260033	-62 . 601572	-4098 . 6488	164 . 06008
00 . 15	-3 . 6143080	-41 . 553484	-1814 . 3352	108 . 87227
00 . 20	-3 . 5979831	-30 . 976014	-1014 . 8539	81 . 129746
00 . 25	-3 . 5770769	-24 . 587459	-644 . 83936	64 . 366701
00 . 30	-3 . 5516512	-20 . 294075	-443 . 87667	53 . 094852
00 . 35	-3 . 5217808	-17 . 198670	-322 . 73650	44 . 963342
00 . 40	-3 . 4875537	-14 . 852759	-244 . 14665	38 . 793471
00 . 50	-3 . 4064432	-9 . 512863	-1501 . 82107	29 . 991212
00 . 60	-3 . 3092660	-9 . 2290597	-101 . 79445	23 . 961876
00 . 70	-3 . 1971474	-7 . 554174	-71 . 757437	19 . 517862
00 . 80	-3 . 0713737	-6 . 23652287	-52 . 389612	16 . 079003
00 . 90	-2 . 9333715	-5 . 2388094	-39 . 236818	13 . 321315
01 . 00	-2 . 7846859	-4 . 4011666	-29 . 951576	11 . 051192
01 . 20	-2 . 4618894	-3 . 1208934	-18 . 180324	7 . 5242244
01 . 40	-2 . 1167671	-2 . 2043701	-11 . 472327	4 . 93223998
01 . 60	-1 . 7633719	-1 . 5404365	-7 . 4701069	2 . 9581355
01 . 80	-1 . 4152141	-1 . 0645887	-5 . 03291360	1 . 4686191
02 . 00	-1 . 0845194	-1 . 73436399	-3 . 5481350	1 . 35079364
02 . 20	-1 . 78160860	-1 . 51849048	-2 . 6592857	-46772714
02 . 40	-1 . 51443591	-1 . 39133199	-2 . 1458539	-1 . 0426573
02 . 60	-1 . 28831215	-1 . 32346654	-1 . 86227932	-1 . 420127
02 . 80	-1 . 0582239	-1 . 34692692	-1 . 7232056	-1 . 6395617
03 . 00	-1 . 0306768	-1 . 46500281	-1 . 6562446	-1 . 7364274
03 . 50	-1 . 20978939	-1 . 5805181	-1 . 5364354	
04 . 00	-1 . 21346833	-1 . 55984547	-1 . 4427918	-1 . 322255
04 . 50	-1 . 14682983	-1 . 57435074	-1 . 214388	-1 . 0479029
05 . 00	-1 . 09024193	-1 . 52181857	-1 . 96531909	-1 . 86897249
07 . 50	-1 . 14173627	-1 . 39057610	-1 . 7897499	-1 . 58810046
10 . 00	-1 . 0958066	-1 . 3146644	-1 . 2658983	-1 . 4143608
15 . 00	-1 . 0434087	-1 . 2567556	-1 . 176150	-1 . 2523307
20 . 00	-1 . 0121974	-1 . 1958124	-0 . 0566831	-1 . 191216

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 1.2$

Ω	\bar{C}_{Lh}	$\bar{C}_{L\alpha}^*$
0.0 .01	-2 .2214072	-750 .83889
0.0 .02	-2 .2212797	-367802 .61
0.0 .03	-2 .2216672	-91946 .849
0.0 .04	-2 .2207698	-40862 .450
0.0 .05	-2 .2199201	-22982 .910
0.0 .06	-2 .2199201	-10211 .812
0.0 .08	-2 .2187311	-5741 .9287
0.0 .10	-2 .2172032	-3673 .0131
0.0 .12	-2 .2119050	-1629 .6458
0.0 .15	-2 .2045063	-914 .47631
0.0 .20	-2 .1950257	-583 .46497
0.0 .25	-2 .1950257	-23 .223358
0.0 .30	-2 .1834870	-403 .66685
0.0 .40	-2 .169192	-224 .26514
0.0 .50	-2 .1543562	-142 .22366
0.0 .60	-2 .0730002	-97 .342883
0.0 .70	-2 .0215798	-70 .322291
0.0 .80	-1 .9636462	-52 .8226095
0.0 .90	-1 .8997592	-40 .871604
0.1 .00	-1 .8305284	-32 .360732
0.1 .20	-1 .6786708	-21 .380744
0.1 .40	-1 .5136137	-9 .933854
0.1 .60	-1 .3411239	-8 .5628050
0.2 .00	-1 .6685239	-7 .4357800
0.2 .20	-1 .9615730	-6 .5233969
0.2 .40	-1 .3374906	-5 .1355194
0.2 .60	-1 .5136137	-4 .1333075
0.2 .80	-1 .3411239	-3 .3837158
0.3 .00	-1 .6685239	-2 .8120406
0.3 .50	-1 .3374906	-2 .0333713
0.4 .00	-1 .6835352	-1 .7733445
0.4 .50	-1 .54856116	-1 .5751798
0.5 .00	-1 .43075495	-1 .4253396
0.7 .50	-1 .33110318	-1 .3126978
0.8 .00	-1 .15939119	-1 .1368984
0.9 .00	-0 .07896672	-1 .0351272
0.9 .50	-0 .05352618	-1 .95096652
1.0 .00	-0 .04766825	-1 .86488806
1.0 .50	-0 .02886718	-1 .58771913
1.5 .00	-0 .0288895	-1 .4607107
1.5 .50	-0 .009115	-1 .3284656
2.0 .00	-0 .0030421	-1 .2452621

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 1.3$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-1.8511613	-1.8510211	-1.875.41389	-1.83898.95
00.02	-1.8510211	-1.875.69029	-1.85971.075	4.68.80549
00.03	-1.8507873	-1.8504602	-1.80428.875	2.34.36923
00.04	-1.8504602	-1.8504602	-1.81489.106	1.56.20891
00.06	-1.8495256	-1.8495256	-1.8103.5573	1.17.11759
00.08	-1.8482178	-1.8482178	-1.8868.6170	78.003948
00.10	-1.8465373	-1.8465373	-1.834.1608	58.424833
00.15	-1.8407110	-1.8407110	-1.812.48270	46.659560
00.20	-1.8325769	-1.8325769	-1.82304.48270	30.920797
00.25	-1.8221576	-1.8221576	-1.8454.90589	22.996361
00.30	-1.8094820	-1.8094820	-1.846.478872	18.198147
00.40	-1.7945855	-1.7945855	-1.8513.52346	14.963570
00.50	-1.7775086	-1.7775086	-1.844.33701	12.623044
00.60	-1.7370095	-1.7370095	-1.810.18066	10.841860
00.70	-1.6884291	-1.6884291	-1.868.872041	8.2884139
00.80	-1.6322971	-1.6322971	-1.86.478872	6.5231109
00.90	-1.5692199	-1.5692199	-1.85.023320	5.2122597
01.20	-1.4998722	-1.4998722	-1.84.336987	4.1895200
01.40	-1.4249871	-1.4249871	-1.84.336987	3.3628701
01.60	-1.3617617	-1.3617617	-1.84.227964	2.6773884
01.80	-1.3040613	-1.3040613	-1.84.2246590	1.6026759
02.00	-1.24793325	-1.24793325	-1.85.9195722	
02.40	-1.18661513	-1.18661513	-1.85.8521013	8.0263563
02.60	-1.90496755	-1.90496755	-1.85.9922216	1.9615382
02.80	-72485424	-72485424	-1.85.8320870	2.627639
03.00	-55194103	-55194103	-1.85.8998541	6.0356406
03.50	-39154430	-39154430	-1.85.6379304	8.4728192
04.00	-24793325	-24793325	-1.85.88846116	1.0106153
04.50	-124417387	-1.24417387	-1.85.3491472	-1.1077960
05.00	-02205713	-0.2205713	-1.85.1707951	-1.1515216
05.50	-05788828	-0.5788828	-1.85.0611712	-1.1533386
07.00	-16740814	-1.6740814	-1.85.9215591	-1.0407272
10.00	-17834098	-1.7834098	-1.85.3491472	-1.0106153
15.00	-0472991	-0.472991	-1.85.78875733	8.6131161
20.00	-0109922	-0.109922	-1.85.66432150	6.980285
	-0068283	-0.068283	-1.85.55339164	5.8492155
	-	-	-1.85.25241650	3.8239504
			-1.85.329916	2702918
			-1.85.33972	1758063
			-1.85.240906	1368057

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 1.3$

Ω	\bar{C}_{Lh}	$* \bar{C}_{Lh}$	$\bar{C}_{L\alpha}$	$* \bar{C}_{L\alpha}$
00.01	-1.3536148	-530.62022	-216670.15	287.41257
00.02	-1.3535385	-265.29996	-54165.634	143.69070
00.03	-1.3534114	-176.85536	-24072.205	95.76492
00.04	-1.3532333	-132.62968	-13539.505	71.814195
00.05	-1.3527248	-68.397239	-6016.1489	47.841522
00.06	-1.3520131	-66.274268	-3382.9749	35.844820
00.08	-1.3510985	-52.995095	-2164.1922	28.638518
00.10	-1.3479269	-35.273872	-960.45937	19.006044
00.15	-1.3434973	-26.396608	-539.15936	14.164166
00.20	-1.3378203	-21.057089	-344.15963	11.238728
00.25	-1.3309094	-17.486615	-238.24012	9.2717208
00.30	-1.3234544	-12.999891	-174.3737	7.8526108
00.40	-1.2912978	-10.283736	-132.93679	6.7761634
00.50	-1.2646484	-8.4541837	-84.215541	5.2409182
00.60	-1.2337556	-7.1326029	-57.769630	4.1874630
00.70	-1.1989061	-6.1298409	-41.843908	3.4109843
00.80	-1.1604202	-5.3409378	-31.527902	2.8092875
00.90	-1.1186473	-4.7030100	-24.475525	2.3257631
01.00	-1.0267571	-3.7336257	-19.450903	1.9265741
01.20	-0.92643684	-3.0336305	-12.958650	1.3026579
01.40	-0.82104256	-2.5090094	-9.1086568	83700524
01.60	-0.71392016	-2.0701458	-6.6693753	47961585
01.80	-0.60824853	-1.7958026	-5.0503922	20249230
02.00	-0.50689887	-1.5536226	-3.9385572	01174288
02.20	-0.41231819	-1.3654442	-3.1552101	1.17497203
02.40	-0.32644300	-1.2198477	-2.5914939	-2.29608328
02.60	-0.25064682	-1.1078188	-2.1780661	-3.824980
02.80	-0.18572281	-1.0220053	-1.869307	-4.395356
03.00	-0.07123204	-0.88454366	-1.6331545	-4.7352089
03.50	-0.01581722	-0.80530977	-1.2369087	-4.8646234
04.00	-0.00085726	-0.74416291	-0.98372365	-4.4398535
04.50	-0.00078103	-0.68424207	-0.79573601	-3.8806575
05.00	-0.02928896	-0.47019468	-0.64644851	-3.4096245
07.50	-0.01394996	-0.37052712	-0.1584431	-1.7359457
10.00	-0.00094680	-0.25381483	-0.06673173	-1.1841317
15.00	-0.00356114	-0.18632963	-0.03612292	-0.09191458
20.00	-	-	-	-

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 1.4$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	$* C_{Ma}$
00.01	-1.12800.56	-2.65.30673	-1.08333.92	151.07021
00.02	-1.1279216	-1.32.64321	-2.7081.661	75.518473
00.03	-1.1277817	-8.84.17529	-1.2034.947	50.32172
00.04	-1.1275859	-6.63.01307	-6.7659.68	37.725981
00.06	-1.1270265	-4.41.78326	-3.006.9190	25.113715
00.08	-1.1262437	-3.31.10088	-1.690.3326	18.796520
00.10	-1.1252378	-2.64.63758	-1.080.9421	14.997368
00.15	-1.1217500	-1.75.86350	-4.79.07841	9.9061578
00.20	-1.1168800	-1.31.31037	-2.68.43125	3.332261
00.25	-1.1106406	-1.04.44751	-1.70.93731	5.7678438
00.30	-1.1030483	-8.64.31797	-1.17.98356	4.7064903
00.35	-1.0941228	-7.34.73694	-8.60.60241	3.9334175
00.40	-1.0838878	-6.36.78738	-6.5347052	3.3407911
00.50	-1.0595992	-4.9790551	-4.1.005681	2.4813631
00.60	-1.0304354	-4.0350118	-2.7.805896	1.8770170
00.70	-9.669806	-3.34.66796	-1.9.869915	1.4204154
00.80	-9.5873360	-2.81.97115	-1.4.74260	1.0581378
00.90	-9.1692804	-2.40.18315	-1.1.249619	.76069880
01.00	-8.7170181	-2.06.17444	-8.7.737605	.51055271
01.20	-7.7260587	-1.54.24575	-5.60.79744	.11165594
01.40	-6.6586915	-1.1.685283	-3.7709477	-.19013712
01.60	-5.55486832	-1.8.9325619	-2.6.440457	-.42042086
01.80	-4.4372723	-1.6.9009699	-1.9.2291373	-.59380208
02.00	-3.3612164	-1.5.4218195	-1.4.6670378	-.71985200
02.20	-2.3530644	-1.4.3781552	-1.1.6557402	-.80578438
02.40	-1.4397595	-1.3.6784736	-1.9.6867186	-.85762302
02.60	-0.641638	-1.3.32405	-1.8.37640	-.88085307
02.80	-0.0281476	-1.3.0269862	-1.7.5358025	-.88062897
03.00	.5636888	-1.2.9569506	-1.6.9482377	-.86184821
03.50	.13370905	-1.31497727	-1.60.160900	-.76310140
04.00	.14581938	-1.34517768	-1.52459808	-.63704841
04.50	.12133434	-1.35687505	-1.44118209	-.52402868
05.00	.08843185	-1.34391747	-1.35753965	-.44191668
07.50	.06319630	-1.24825947	-1.15995741	-.28681011
10.00	.02109569	-1.0262879	-1.08029582	-.20497933
15.00	.00141549	-1.3565939	-1.03058936	-.14026191
20.00	-.00548052	-0.9368797	-.01614275	-.10899009

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 1.4$

Ω	\bar{C}_{Lh}	C_{Lh}^*	$\bar{C}_{L\alpha}$	$C_{L\alpha}^*$
0.1	- .91103918	- 409.97067	- 147589.59	122.98649
0.2	- .91098857	- 404.97850	- 136896.282	61.484137
0.3	- .91090422	- 136.64474	- 16397.521	40.97303
0.4	- .91078615	- 102.47559	- 9222.9548	30.723851
0.5	- .91044885	- 68.301883	- 4098.2649	20.462331
0.6	- .91044885	- 51.210487	- 2304.6239	15.325509
0.8	- .90997681	- 40.952020	- 1474.4247	12.238574
1.0	- .90937020	- 27.263523	- 654.47677	8.1085832
1.5	- .90432800	- 20.408060	- 367.49759	6.0285907
2.0	- .90056145	- 16.285915	- 234.67006	4.7687115
2.5	- .90056145	- 13.530542	- 162.51984	3.9190104
3.0	- .89597540	- 11.556298	- 119.01865	3.3038232
4.0	- .89058027	- 10.070380	- 90.787892	2.8353370
5.0	- .88438829	- 7.9779797	- 57.597344	2.1629156
6.0	- .86967156	- 6.5703191	- 39.579481	1.6970543
7.0	- .85195776	- 5.548126	- 28.727074	1.3501818
8.0	- .83140541	- 4.7852757	- 21.695293	1.0786347
9.0	- .80819699	- 4.1805782	- 16.886095	.85825215
10.0	- .78253664	- 3.921047	- 13.457688	.67461219
12.0	- .75464762	- 2.9505849	- 9.0226226	.38415321
15.0	- .693145730	- 2.4153011	- 6.3861966	1.6458315
20.0	- .62577891	- 2.0135985	- 4.7099647	.00525190
30.0	- .55469137	- 1.7049054	- 3.5921328	.13719884
40.0	- .48207797	- 1.4644828	- 2.8200161	.23866875
60.0	- .4103796	- 1.2760688	- 2.2720868	.31482596
100.0	- .34049493	- .73681910	- 8.991775	
150.0	- .27512066	- 1.1282399	- 1.8745775	.36964997
200.0	- .21527633	- 1.0124927	- 1.5804986	.40647118
300.0	- .16197353	- .92218885	- 1.3587547	.42824008
500.0	- .11585627	- .85195830	- 1.1881620	.43765382
700.0	- .03300072	- .73681910	- 8.991775	.42299570
1000.0	- .00823318	- 66988211	- 71458699	.37929624
1500.0	- .02032876	- 62049391	- 57887676	.33015930
2000.0	- .01809028	- 57413687	- 47156736	.28872736
0.7	.02317949	- 39617482	- 20835941	.19556150
1.5	.00673163	- 31120791	- 11244837	.4300283
2.0	.00244295	- 20600366	- 04706389	.9984772
0.0	.00106506	- 15147290	- 02718624	.07669007

Table 1208.2 AEROdynamic FLUTTER COEFFICIENTS (Continued), Lift, M = 1.5

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-75919482	-20498306	-73794128	34.158149
00.02	-75913915	-10248470	-184470473	17.069395
00.03	-75904637	-68315540	-11980926	11.368842
00.04	-75891648	-54228686	-46108095	8.5153414
00.06	-75854547	-34137283	-20484648	5.6553945
00.08	-75802627	-25587040	-11516446	4.2189821
00.10	-75735908	-20453267	-73654553	3.3519922
00.15	-75504559	-13597714	-3265713	2.1810601
00.20	-75181486	-10158746	-18308575	1.5796841
00.25	-74767502	-80865417	-11667483	1.2062662
00.30	-74263648	-66978478	-80603177	94697207
00.35	-73671186	-56988674	-58856646	75304199
00.40	-72991601	-49462223	-44745933	60011891
00.50	-71378064	-38792600	-28161753	36866759
00.60	-69439094	-31556268	-19166179	19602736
00.70	-67193871	-26291951	-13755479	05812600
00.80	-64664442	-22270239	-10257104	05692954
00.90	-61875430	-19086838	-78718809	15563480
01.00	-58853706	-16499855	-61787474	24180192
01.20	-52228734	-12552722	-40077182	38514519
01.40	-45035648	-97073844	-27405334	49775786
01.60	-37532319	-76029098	-19563465	58488913
01.80	-29975607	-60355067	-14526186	64963987
02.00	-22609099	-48774573	-1214197	69430257
02.20	-15652074	-40406931	-90051846	72093613
02.40	-9290291	-34590891	-75174124	73161002
02.60	-03669077	-30794663	-65052535	72848831
02.80	-0110977	-28569710	-58050910	71382984
03.00	-04995579	-27527696	-53055649	68994379
03.50	-0830586	-27987979	-4915004	60466318
04.00	-11992627	-29799573	-38672376	50772576
04.50	-10281039	-30659762	-32449446	42173616
05.00	-07627909	-30843451	-26361244	35738826
07.50	-04137499	-2173948	-11209472	23221417
10.00	-00714516	-17062847	-05442073	16814023
15.00	-00481993	-10556962	-02094539	11848386
20.00	-00114393	-07459111	-01345575	09053547

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 1.5$

Ω	\bar{C}_{Lh}	$* C_{Lh}$	$\bar{C}_{L\alpha}$	$* C_{L\alpha}$
0.0 .01	- 6 5 3 4 5 4 3 3 8	- 3 3 4 . 5 7 1 5 0	- 1 0 9 8 0 8 . 1 9	4 7 . 1 7 9 6 9 7
0.0 .02	- 6 5 3 4 1 8 5 2	- 1 6 7 . 2 8 0 8 5	- 2 7 4 5 1 . 3 2 5	2 3 . 5 8 3 9 6 3
0.0 .03	- 6 5 3 3 5 8 7 5	- 1 1 1 . 5 1 5 1 2	- 1 2 2 0 0 . 0 5 4	1 5 . 7 1 6 1 0 4
0.0 .04	- 6 5 3 2 7 5 0 9	- 8 3 . 6 3 0 6 2 4	- 6 8 6 2 . 1 0 6 9	1 1 . 7 8 0 2 1 3
0.0 .05	- 6 5 3 0 3 6 0 8	- 5 5 . 7 4 2 8 6 5	- 3 0 4 . 9 . 2 9 3	7 . 8 4 0 4 0 2 7
0.0 .06	-	-	-	-
0.0 .08	- 6 5 2 7 0 1 6 0	- 4 1 . 7 9 5 7 2 5	- 1 7 1 4 . 8 0 5 4	5 . 8 6 6 5 8 1 6
0.0 .10	- 6 5 2 4 7 1 7 4	- 3 3 . 4 2 4 8 3 8	- 1 0 9 7 . 1 2 9 4	4 . 6 7 9 1 6 0 7
0.0 .12	- 6 5 0 7 8 0 9 5	- 2 2 . 2 5 6 0 9 3	- 4 8 7 . 0 8 0 1 0	3 . 0 8 6 8 3 7 4
0.0 .15	- 6 4 8 6 9 8 4 2	- 1 6 . 6 6 3 6 7 3	- 2 7 3 . 5 6 4 5 3	2 . 8 0 9 8 5 1
0.0 .20	- 6 4 6 0 2 8 7 1	- 1 3 . 3 0 1 8 5 6	- 1 7 4 . 7 3 9 1 4	1 . 7 8 9 7 9 3 4
0.0 .25	-	-	-	-
0.0 .30	- 6 4 2 7 7 7 6 5	- 1 1 . 0 5 5 4 1 8	- 1 2 1 . 0 5 8 1 4	1 . 4 5 6 0 0 8 6
0.0 .35	- 6 3 8 9 5 2 3 5	- 9 . 4 4 6 4 2 2 0	- 8 8 . 6 9 2 1 8 0	1 . 2 1 2 2 5 0 7
0.0 .40	- 6 3 4 5 6 1 1 3	- 8 . 2 3 5 9 0 9 8	- 6 7 . 6 8 7 4 7 2	1 . 0 2 4 8 4 1 6
0.0 .50	- 6 2 4 1 2 0 3 3	- 6 . 5 3 2 4 7 1 0	- 4 2 . 9 9 1 5 9 4	. 7 5 1 7 6 1 0 7
0.0 .60	- 6 1 1 5 4 5 6 7	- 5 . 3 8 7 6 6 5 9	- 2 9 . 5 8 3 9 6 9	. 5 5 8 3 1 5 3 4
0.0 .70	- 5 9 6 9 4 5 3 7	- 4 . 5 6 2 6 9 0 4	- 2 1 . 5 0 7 1 6 5	. 4 1 0 9 8 0 0 1
0.0 .80	- 5 8 0 4 4 4 1 9	- 3 . 9 3 8 2 1 9 2	- 1 6 . 2 7 2 6 1 7	. 2 9 3 0 7 1 0 6
0.0 .90	- 5 6 2 1 8 1 8 7	- 3 . 4 4 8 0 1 9 9	- 1 0 . 6 9 1 3 9 3	. 1 9 5 3 8 1 5 5 6
0.1 .20	- 5 4 2 3 1 1 5 3	- 3 . 0 5 2 3 9 8 2	- 1 0 . 1 3 7 2 1 6	. 1 2 4 3 5 5 4
0.1 .40	- 4 5 0 1 7 3 9 1	- 2 . 0 1 9 4 9 5 7	- 4 . 8 6 0 2 0 1 1	. 1 2 5 8 0 1 8 0
0.1 .60	- 3 9 9 0 9 5 8 1	- 1 . 6 9 4 3 4 4 1	- 3 . 6 0 4 3 6 1 8	. 2 0 7 3 2 3 9 6
0.1 .80	- 3 4 6 7 0 7 0 2	- 1 . 4 4 6 8 8 2 7	- 2 . 7 6 3 7 7 1 3	. 2 7 0 8 3 2 3 8
0.2 .00	- 2 9 4 4 8 7 3 5	- 1 . 2 4 8 0 1 6 1	- 2 . 1 8 0 4 3 5 9	. 3 1 9 1 5 6 1 5
0.2 .20	- 2 4 3 8 0 8 7 7	- 1 . 0 9 3 6 1 3 4	- 1 . 7 6 4 1 5 9 7	. 3 5 4 3 6 5 6
0.2 .40	- 1 9 5 8 8 2 4 1	- 9 7 1 5 2 7 3 5	- 1 . 4 6 0 2 4 7 9	. 3 7 8 1 7 1 9 8
0.2 .60	- 1 5 1 7 1 6 3 8	- 8 7 5 0 1 6 1 3	- 1 . 2 3 3 8 8 9 8	. 3 9 2 1 1 7 7 7
0.2 .80	- 1 1 2 0 8 6 0 0	- 7 9 8 8 6 8 0 1	- 1 . 0 6 2 0 5 7 1	. 3 9 7 6 6 7 1 6
0.3 .00	- 0 7 7 5 1 7 6 6	- 7 3 8 9 0 1 7 4	- 1 . 9 2 0 5 1 7 8	. 3 9 6 2 3 5 9 6
0.3 .50	- 0 1 4 4 6 1 1 4	- 6 3 8 5 7 1 8 4	- 7 0 2 2 5 1 1 7	. 3 7 0 9 3 0 4 0
0.4 .00	. 0 1 7 6 6 0 0 0	. 5 7 9 4 0 2 3 1	. 5 5 7 3 6 4 7 2	. 3 2 9 5 0 1 6 1
0.4 .50	. 0 2 6 9 7 3 3 1	. 5 3 6 9 0 9 4 7	. 4 5 1 6 8 3 3 7	. 2 8 6 3 8 5 9 6
0.5 .00	. 0 2 3 9 7 6 7 8	. 4 9 8 5 1 8 1 4	. 3 6 8 4 9 4 4 4	. 2 5 0 0 1 5 6 5
0.7 .50	. 0 1 6 8 0 4 8 4	. 3 4 4 1 7 1 2 8	. 1 6 0 3 1 2 1 5	. 1 6 6 9 5 1 2 7
1.0 .00	- 0 0 2 1 8 5 6 7	- 2 6 8 4 4 2 1 2	. 0 8 5 9 3 3 0 7	. 2 2 9 0 7 9 2
2.0 .00	- 0 0 2 9 8 7 6 4	- 1 7 3 8 1 5 7 3	. 0 6 3 9 0 6 7	. 8 6 6 5 0 3 9
	. 0 0 0 6 7 4 4 4	. 1 2 9 2 1 5 1 6	. 2 1 9 2 1 3 3	. 0 6 5 6 6 1 6 1

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 1.6$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-54454213	-167.28412	-54903.668	-16.446929
00.02	-54450268	-83.637157	-13725.235	-8.2296934
00.03	-5443694	-55.752660	-6099.597	-5.4933823
00.04	-54434491	-41.808779	-3430.6273	-4.1273020
00.06	-54408201	-27.861635	-1524.2187	-2.7653695
00.08	-54371411	-20.884805	-856.97595	-2.0885467
00.10	-54324133	-16.696106	-548.13823	-1.6857624
00.15	-54160186	-11.103621	-243.11461	-1.1583353
00.20	-53931217	-8.2993503	-136.35823	-0.90486219
00.25	-5363778	-6.6104515	-86.947344	-0.76088519
00.30	-53280577	-5.4793294	-60.109046	-6.7156486
00.35	-52860476	-4.6670316	-43.928660	-6.138190
00.40	-52378486	-4.0540960	-33.429282	-5.7456224
00.50	-51233612	-3.1874423	-21.088420	-5.31447894
00.60	-49856907	-2.6007741	-14.393132	-5.1447894
00.70	-48261470	-2.1748056	-10.364629	-5.1181693
00.80	-46462375	-1.84999808	-7.7585442	-5.173435
00.90	-44476485	-1.5932795	-5.9803173	-5.2764806
01.00	-42323935	-1.3849395	-4.7167073	-5.4057714
01.20	-37588876	-1.0673796	-3.0928672	-5.6921469
01.40	-32432162	-8.3834110	-2.1407265	-5.9647983
01.60	-271565637	-6.6836206	-1.5474879	-6.186299
01.80	-16207785	-5.4087803	-1.1627730	-6.3451018
02.00	-11114692	-4.4559866	-0.9657444	-6.4256311
02.50	-0.6421889	-3.2548199	-0.73285245	-6.4283960
02.60	-0.62238342	-2.9138261	-0.53017800	-6.2166092
02.80	-0.1356901	-2.6981799	-0.47105568	-6.0180929
03.00	-0.4316303	-2.5786010	-0.42782669	-5.7719711
03.50	-0.6898274	-2.5408081	-0.356233	-5.0271488
04.00	-0.9961770	-2.6439095	-0.3036347	-6.3564837
04.50	-0.8706459	-2.7019635	-0.25411956	-3.5474175
05.00	-0.6523880	-2.6424109	-0.20665389	-3.0188816
07.50	-0.2650529	-1.8457393	-0.08385794	-1.9693121
10.00	-0.0001465	-1.4625155	-0.04014228	-1.4441633
15.00	-0.00462843	-0.8641163	-0.01635466	-1.0288064
20.00	-0.00139123	-0.6366423	-0.01158598	-0.7716180

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 1.6$

Ω	\bar{C}_{Lh}	C_{Lh}^*	$\bar{C}_{L\alpha}$	$C_{L\alpha}^*$
0.0 .01	- 49001520	- 28323146	- 86617.957	8 .2395430
0.0 .02	- 48998858	- 14120564	- 21623.889	4 .1157011
0.0 .03	- 48994421	- 94403954	- 9623.6241	2 .7392784
0.0 .04	- 48988211	- 70798679	- 5412.9966	2 .0497108
0.0 .05	- 48970470	- 47190957	- 2405.4056	1 .3574322
0.0 .06	- 48945642	- 35384651	- 1352.7489	1 .0085844
0.0 .08	- 48913734	- 28298916	- 865.51950	.79711197
0.0 .10	- 48803069	- 18845596	- 384.30601	.50885712
0.0 .15	- 48648465	- 14121899	- 215.88243	.35802576
0.0 .20	- 48450250	- 11268504	- 137.92762	.26221267
0.0 .25	- 48208843	- 93683179	- 95.583125	.19396083
0.0 .30	- 47924751	- 80677390	- 70.052097	.14151254
0.0 .40	- 47598573	- 69844754	- 53.482891	.08997231
0.0 .50	- 46822786	- 55453458	- 34.001371	.03205630
0.0 .60	- 45739789	- 45790112	- 23.421700	.03557717
0.0 .70	- 44801910	- 38832925	- 17.051260	.06435160
0.0 .80	- 43573572	- 3571569	- 12.929393	.10241360
0.1 .90	- 42213025	- 29445195	- 10.093494	.13618726
0.1 .20	- 40731311	- 26117632	- 8.0765653	.16655620
0.1 .30	- 37452677	- 21075630	- 5.429868	.21903198
0.1 .40	- 33840570	- 17439614	- 3.9039523	.26221697
0.1 .60	- 30004733	- 14707241	- 2.9077602	.29719760
0.2 .00	- 26005699	- 2598726	- 2.389708	.32459538
0.2 .20	- 22106610	- 10944504	- 1.731119	.34489248
0.2 .50	- 18255830	- 96342819	- 1.4391774	.35857068
0.2 .40	- 14596094	- 85917431	- 1.1941457	.36616990
0.2 .60	- 11204853	- 77610987	- 1.016562	.6830329
0.2 .80	- 08143259	- 7095965	- 87061651	.36565445
0.3 .00	- 05454774	- 65732025	- 76168951	.35895935
0.3 .50	- 00488924	- 56767564	- 57494726	.32953758
0.4 .00	02090676	51393244	45560705	.29109962
0.4 .50	02835650	47590596	36912633	.25293879
0.5 .00	02518664	44261440	30136649	.2075235
0.7 .50	01152631	30516800	12923510	.14638176
1.0 .00	- 00036854	- 23598458	6920391	.10863911
2.0 .00	- 00240861	- 15123326	2992692	.07673344
	.00120876	.11374445	.01816890	.05737442

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 1.7$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00. 01	-4 0834363	-14 1 61451	-4 3308 686	-40 339967
00. 02	-4 0831435	-7 0 80357	-1 0826 701	-20 174277
00. 03	-4 0826555	-4 7 19830	-4 811 5191	-13 454289
00. 04	-4 0819724	-3 5 39444	-2 706 2054	-10 095725
00. 06	-4 0800210	-2 3 58813	-1 202 4100	-6 7400203
00. 08	-4 0772900	-1 7 68253	-6 76 08185	-5 0650245
00. 10	-4 0737806	-1 4 13722	-4 32 46733	-4 0623084
00. 15	-4 0616103	-9 4044797	-1 91 86127	-2 7319851
00. 20	-4 0446117	-7 0320849	-1 07 65045	-2 0738844
00. 25	-4 0228245	-5 6038924	-6 8 674281	-1 6846148
00. 30	-3 962995	-4 6447867	-4 7 503538	-1 4296988
00. 35	-3 9650984	-3 9617223	-3 4 739798	-1 2514919
00. 40	-3 9292937	-3 443224	-2 6 457226	-1 211620
00. 50	-3 8442163	-2 7135322	-1 6 721313	-9 4643153
00. 60	-3 7492630	-2 8120761	-1 1 398073	-8 3435169
00. 70	-3 6231476	-1 8616087	-8 2588688	-7 6729661
00. 80	-3 4891822	-1 5890338	-6 2011002	-7 1939692
00. 90	-3 3411726	-1 5739332	-4 79691393	-6 8630205
01. 00	-3 1804490	-1 1995617	-3 7969188	-6 6309774
01. 20	-2 8266614	-9 3404920	-2 5105781	-6 3476969
01. 40	-2 4401382	-7 4252109	-1 7535788	-6 1936919
01. 60	-2 0339330	-6 0002330	-1 27935799	-6 0928291
01. 80	-1 6212359	-4 9256868	-1 96955659	-6 003334
02. 00	-1 2147886	-4 1152559	-7 6118323	-5 9017464
02. 20	-0 8263419	-3 5108458	-6 1810946	-5 7755130
02. 40	-0 4661852	-3 0701361	-5 1824410	-5 6191147
02. 60	-0 1427699	-2 7601160	-4 4741331	-5 4318036
02. 80	-0 1375558	-2 5536335	-3 9617928	-5 2161188
03. 00	-0 3706927	-2 4275492	-3 5809285	-4 9768141
03. 50	-0 7403910	-2 3386598	-2 9431157	-4 3170352
04. 00	-0 8358662	-2 3881709	-2 4873644	-3 6539962
04. 50	-0 7405703	-2 4223824	-2 0760815	-3 0750784
05. 00	-0 583237	-2 3726721	-1 6889055	-2 6269708
07. 50	-0 1632606	-1 6348620	-0 6576423	-1 7216620
10. 00	-0 0333346	-1 2723276	-0 3162176	-1 2769546
15. 00	-0 0331513	-0 7400874	-0 1386604	-0 9080760
20. 00	.00198499	.05655485	.00977743	.06719145

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 1.7$

Ω	\bar{C}_{Lh}	C_{Lh}^*	$\bar{C}_{L\alpha}$	$C_{L\alpha}^*$
00. 01	- . 37977843	- 246. 09894	- 71192. 971	- 13. 185946
00. 02	- . 37975798	- 123. 04662	- 17797. 878	- 6. 5959315
00. 03	- . 37972389	- 82. 027917	- 7909. 8982	- 4. 4005746
00. 04	- . 37967616	- 61. 517616	- 4449. 1. 052	- 3. 3038819
00. 06	- . 37953985	- 41. 005417	- 1977. 1. 102	- 2. 2091597
00. 08	- . 37934908	- 30. 747424	- 1111. 449121	- 1. 6637673
00. 10	- . 37910390	- 24. 591114	- 711. 449121	- 1. 3381046
00. 15	- . 37825352	- 16. 378305	- 315. 93075	- 90846104
00. 20	- . 37706544	- 12. 267219	- 177. 50013	- 69851284
00. 25	- . 37554209	- 9. 7968640	- 113. 42743	- 57640785
00. 30	- . 37368658	- 8. 1469174	- 78. 623464	- 4. 9818723
00. 35	- . 37150272	- 6. 9658206	- 57. 638758	- 4. 4500457
00. 40	- . 36899497	- 6. 0778013	- 44. 019890	- 4. 0743079
00. 50	- . 36302885	- 4. 8294765	- 28. 06911	- 36022872
00. 60	- . 35583666	- 3. 9918801	- 19. 312189	- 33451628
00. 70	- . 34747651	- 3. 3893257	- 14. 0733311	- 32078915
00. 80	- . 33801546	- 2. 9340134	- 10. 676866	- 31425663
00. 90	- . 32752884	- 2. 5772000	- 8. 3520464	- 31322643
01. 00	- . 31609940	- 2. 2896655	- 6. 6928383	- 31305893
01. 20	- . 29077454	- 1. 8543402	- 4. 5414665	- 31940436
01. 40	- . 26281501	- 1. 5405839	- 3. 2565172	- 3216927
01. 60	- . 23304980	- 1. 3047285	- 2. 4339584	- 33671240
01. 80	- . 20232803	- 1. 1224718	- 1. 8803851	- 34357227
02. 00	- . 17148448	- 97911378	- 1. 4935949	- 34794365
02. 20	- . 14130700	- 86512734	- 1. 2153217	- 34943384
02. 40	- . 11250745	- 77395549	- 1. 0102882	- 34793278
02. 60	- . 08567747	- 70063797	- 85607458	- 34353371
02. 80	- . 06137013	- 64215442	- 737866196	- 33647781
03. 00	- . 03988800	- 59504339	- 64554408	- 32711111
03. 50	. 00020713	- 51356713	- 48656538	- 29639144
04. 00	. 02138163	- 46390154	- 38491463	- 36088904
04. 50	. 02749823	- 42900421	- 314965775	- 322676876
05. 00	. 02440888	- 39920344	- 25452654	- 19800778
07. 50	. 00747162	- 27463019	- 10779498	- 13086614
10. 00	. 00164645	. 21052197	. 05792872	. 09789305
15. 00	. 00155118	. 1347101	. 02562395	. 6874835
20. 00	. 00100945	. 10213041	. 01528985	. 5102601

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 1.8$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	$* C_{Ma}$
00.01	-31648021	-12304853	-35596274	-52005526
00.02	-31645771	-61521412	-88987278	-26005875
00.03	-31642021	-4107550111	-35547378	-17340707
00.04	-31636772	-30497015	-32243413	-13009160
00.06	-31621778	-98834389	-98834389	-86796858
00.08	-3160794	-15366123	-55574496	-65170188
00.10	-31573828	-12286075	-355551362	-52210722
00.15	-31480308	-81749541	-155775490	-34979501
00.20	-31349677	-61147240	-88540287	-26415077
00.25	-31182231	-48748977	-56504828	-21316957
00.30	-30978347	-40453238	-39103928	-17951547
00.35	-30738488	-34502323	-28612851	-15575798
00.40	-30463193	-30017462	-21804883	-13818114
00.50	-29808853	-23688666	-13801880	-114413483
00.60	-29021195	-19417228	-94587209	-98698506
00.70	-28107254	-16325367	-68441650	-88147389
00.80	-27075138	-12122023	-51514674	-80614595
00.90	-25933941	-12122023	-3951793	-75059413
01.00	-24693632	-10621762	-31722451	-70854649
01.20	-21959246	-83396149	-2113280	-65023789
01.40	-18964711	-66935296	-14851406	-61218123
01.60	-15808720	-54665377	-10911757	-58478343
01.80	-12591555	-45372953	-83222720	-5274394
02.00	-9410771	-38313008	-65669858	-54298961
02.20	-63571162	-32988397	-53498912	-52372800
02.40	-3511204	-29041106	-44903754	-50396329
02.60	-0940140	-26195406	-3872759	-4832325
02.80	-1304143	-24227123	-34198607	-46139010
03.00	-3186423	-22946885	-30791584	-43858636
03.50	-6229355	-21734668	-25038359	-37938424
04.00	-7079605	-21847600	-21005520	-3208345
04.50	-6336756	-21991289	-17484680	-27238080
05.00	-4796772	-21531795	-14224227	-23351322
07.50	-0933781	-14664596	-05348317	-15372942
10.00	-0461873	-11215262	-02621346	-11512366
15.00	-0190719	-06566349	-01229397	-08113036
20.00	-0152687	-05125040	-00810425	-05963234

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 1.8$

Ω	\bar{C}_{Lh}	C_{Lh}^*	\bar{C}_{La}	C_{La}^*
0.0 .01	- .30195458	- 218 .01358	- 60308 .788	- 25 .478348
0.0 .02	- .30193843	- 109 .00453	- 15076 .922	- 12 .741407
0.0 .03	- .30191153	- 72 .667168	- 6700 .6500	- 8 .4967519
0.0 .04	- .30187387	- 54 .497734	- 3768 .9550	- 6 .3751684
0.0 .05	- .30176628	- 36 .326793	- 1674 .8872	- 4 .2550721
0.0 .06	- .29861069	- 8 .6830953	- 96 .130274	- 1 .0560951
0.0 .08	- .30161571	- 27 .239816	- 941 .96353	- 3 .1965097
0.0 .10	- .30142220	- 31 .286426	- 602 .72470	- 2 .5625594
0.0 .15	- .30075101	- 14 .511744	- 267 .67443	- 1 .7207441
0.0 .20	- .29981321	- 10 .6870680	- 150 .40745	- 1 .3035153
0.0 .25	- .29861069	- 8 .6830953	- 96 .130274	- 1 .0560951
0.0 .30	- .29714584	- 7 .2222842	- 66 .6447091	- 89355142
0.0 .35	- .29542158	- 6 .1768073	- 48 .870404	- 7947984
0.0 .40	- .29344133	- 5 .3909503	- 37 .333411	- 69567364
0.0 .50	- .28872908	- 4 .2866886	- 23 .768017	- 58242698
0.0 .60	- .28304638	- 3 .5462229	- 16 .401929	- 51128185
0.0 .70	- .27643792	- 3 .0139064	- 11 .963240	- 46397546
0.0 .80	- .26895539	- 2 .619499	- 9 .0852079	- 43134753
0.1 .00	- .26065688	- 2 .2971644	- 7 .148756	- 40828590
0.1 .20	- .25160624	- 2 .0436572	- 5 .7083099	- 39170499
0.1 .40	- .23152887	- 1 .6601312	- 3 .8835814	- 37072335
0.1 .60	- .20932293	- 1 .3838626	- 2 .7925791	- 35898897
0.1 .80	- .18563284	- 1 .1761500	- 2 .0931143	- 35173138
0.2 .00	- .16112159	- 1 .0154670	- 1 .6214248	- 3463004
0.2 .20	- .13644452	- 8881234	- 1 .2910051	- 34115355
0.2 .40	- .11222440	- .78778379	- 1 .0525639	- 33539633
0.2 .60	- .08902894	- .70662371	- 87 .627629	- 32854132
0.2 .80	- .06731773	- .6417614	- 74319906	- 32037556
0.3 .00	- .04759733	- .58830110	- 64081680	- 31087623
0.3 .50	- .00292844	- .5453304	- 56059430	- 30015312
0.4 .00	.02060134	- 4 .2413480	- 3319465	- 23659960
0.4 .50	.02571929	- 39157492	- 26955511	- 20579851
0.5 .00	.02281766	- 36429955	- 22015258	- 17986018
0.7 .50	.00446072	- 24998029	- 0.9228055	- 1.1871352
1.0 .00	- .00216224	- 19006287	- 0.4992360	- 8942962
1.5 .00	- .00076647	- 12210497	- 0.2252339	- 6224005
2.0 .00	.00054994	- 0.9289662	- 0.1305355	- 0.4607191

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 1.9$

Ω	\bar{C}_{Mh}	C_{Mh}^*	$\bar{C}_{M\alpha}$	$C_{M\alpha}^*$
00.01	-25162738	-109.00604	-30154.3235	-57.568126
00.02	-25160962	-154.500753	-7538.30235	-28.786406
00.03	-25158003	-36.5301319	-3350.31625	-19.193540
00.04	-25153860	-27.245848	-1884.3190	-14.397888
00.05	-25142026	-18.158869	-637.28519	-9.6037960
00.06	-25125464	-13.613874	-470.82345	-7.2083087
00.08	-25104180	-10.885674	-301.20415	-5.7722613
00.10	-25030366	-7.2445824	-133.67938	-3.8611506
00.15	-24927253	-5.4203228	-75.046416	-2.9094495
00.20	-24795070	-4.3228329	-47.908493	-2.3414816
00.25	-24795070	-4.3228329	-47.908493	-2.3414816
00.30	-24634107	-3.5887673	-33.167712	-1.9653474
00.35	-24444719	-3.0624136	-224.280324	-1.6987983
00.40	-24227320	-2.6659219	-18.512925	-1.5007048
00.50	-23710459	-2.1068486	-11.732837	-1.2276056
00.60	-23088040	-1.7299635	-8.0529396	-1.0500250
00.70	-22365476	-1.4574943	-5.8372523	-9.2676783
00.80	-21549015	-1.2505938	-4.4023759	-8.3720269
00.90	-20645672	-1.0877109	-3.4217986	-7.6984108
01.00	-19663142	-95593798	-2.7235178	-7.1776904
01.20	-17494224	-75567915	-2.8222389	-6.4329151
01.40	-15114126	-61126898	-1.2889787	-5.9285689
01.60	-12599625	-50347293	-1.95227897	-5.5594834
01.80	-10029107	-42155140	-72988436	-5.2673915
02.00	-7479286	-35895668	-57817248	-5.0180780
02.20	-5022109	-31127632	-47214659	-4.7909393
02.40	-2721995	-27546601	-39657478	-4.5736880
02.60	-635355	-24917036	-34170836	-4.3594141
02.80	-1200245	-23040069	-30106337	-4.1448115
03.00	-2749000	-21765136	-27020263	-3.9290219
03.50	-5292637	-20344770	-21774664	-3.3919298
04.00	-6047671	-20178248	-18148559	-2.8870954
04.50	-5456167	-20158682	-15066304	-2.4518478
05.00	-4141908	-19706339	-12255091	-2.1088746
07.50	-0453909	-13291205	-0447797	-1.3939047
10.00	-0481542	-10003511	-02258886	-1.0521345
15.00	-0076154	-05972355	-0114357	-0.7323802
20.00	-00075457	-04690076	-00669898	-0.5378946

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 1.9$

Ω	\bar{C}_{Lh}^*	C_{Lh}^*	\bar{C}_{La}^*	C_{La}^*
00 . 01	- 2 4 5 0 3 0 7 3	- 1 9 6 . 0 2 6 8 3	- 5 2 2 7 3 . 8 6 1	- 3 2 . 6 7 3 4 9 9
00 . 02	- 2 4 5 0 1 7 7 1	- 9 8 . 0 1 1 5 7 6	- 1 3 0 6 8 . 2 5 1	- 1 6 . 3 3 7 9 8 5
00 . 03	- 2 4 4 9 9 6 0 1	- 6 5 . 0 3 3 9 0 0 9	- 5 8 0 7 . 9 5 2 7	- 1 0 . 8 9 3 9 1 8
00 . 04	- 2 4 4 9 6 5 6	- 4 9 . 0 0 2 1 1 3	- 3 2 6 6 . 8 4 8 4	- 8 . 1 7 2 4 6 3 3
00 . 06	- 2 4 4 8 7 8 8 9	- 3 2 . 6 6 3 9 9 4	- 1 4 5 1 . 7 7 3 9	- 5 . 4 5 2 1 6 4 3
00 . 08	- 2 4 4 7 5 7 4 7	- 2 4 . 4 9 3 7 1 1	- 8 1 6 . 4 9 7 9 1	- 4 . 0 9 3 1 6 9 7
00 . 10	- 2 4 4 6 0 1 4 3	- 1 9 . 5 9 0 5 6 6	- 5 2 2 . 4 5 5 9 6	- 3 . 2 7 8 6 9 5 8
00 . 15	- 2 4 4 0 6 0 1 8	- 1 3 . 0 5 0 2 0 0	- 2 3 2 . 0 4 4 4 9	- 2 . 1 9 5 4 1 3 9
00 . 20	- 2 4 3 3 0 3 9 1	- 9 . 7 6 9 9 5 9	- 1 3 0 . 0 4 0 9 6	- 1 . 6 5 6 6 3 3 5 0
00 . 25	- 2 4 2 3 3 4 0 9	- 7 . 8 1 0 6 8 1 6	- 8 3 . 3 5 5 0 4 5	- 1 . 3 3 5 5 6 3 2 6
00 . 30	- 2 4 1 1 5 2 6 2	- 6 . 4 9 7 8 3 9 1	- 5 7 . 7 9 9 7 9 5	- 1 . 1 2 3 5 0 1 2
00 . 35	- 2 3 9 7 6 1 7 8	- 5 . 5 5 8 4 3 7 2	- 4 2 . 3 9 1 3 5 9	- 9 7 3 5 5 8 4 3
00 . 40	- 2 3 8 1 6 4 2 8	- 4 . 8 5 2 4 6 4 5	- 3 2 . 3 9 1 2 8 1	- 6 6 2 4 6 0 8 9
00 . 50	- 2 3 3 4 6 2 0 8	- 3 . 8 6 0 8 0 0 2	- 2 0 . 6 3 2 8 2 1	- 7 1 0 1 0 1 2 1
00 . 60	- 2 2 9 7 7 5 4 0	- 3 . 1 9 6 1 9 8 9	- 1 4 . 2 4 7 6 5 3	- 6 1 1 9 1 7 5 2
00 . 70	- 2 2 4 4 3 9 5 0	- 2 . 7 1 8 7 0 3 1	- 1 0 . 3 9 9 7 8 8	- 5 4 4 5 2 3 0 9
00 . 80	- 2 1 1 8 3 9 5 1 6	- 2 . 3 5 8 3 6 1 9	- 7 . 9 0 4 5 8 1 8	- 4 9 6 2 0 2 2 8
00 . 90	- 2 1 1 6 8 8 2 8	- 2 . 0 7 6 3 3 5 2	- 6 . 1 9 6 0 7 5 7	- 4 6 0 4 2 8 5 0
01 . 00	- 2 0 4 3 6 9 3 5	- 1 . 8 4 9 3 3 6 3	- 4 . 9 7 6 1 6 3 7	- 4 3 3 2 7 1 6 0
01 . 20	- 1 8 8 1 1 7 2 3	- 1 . 5 0 6 1 4 2 4	- 3 . 3 9 2 8 9 5 9	- 3 9 5 5 8 9 3 5
01 . 40	- 1 7 0 1 1 4 3 9	- 1 . 2 5 9 0 5 8 9	- 2 . 4 4 5 4 2 5 8	- 3 7 1 2 4 1 5 6
01 . 60	- 1 5 0 8 7 3 4 6	- 1 . 0 7 3 2 7 3 2	- 1 . 8 3 7 2 0 7 0	- 3 5 4 2 1 9 2 4
01 . 80	- 1 3 0 9 2 3 8 4	- 9 2 9 4 2 9 6 4	- 1 . 4 2 6 3 4 8 8	- 3 4 1 1 8 0 6 5
02 . 00	- 1 1 0 7 9 1 3 3	- 8 1 5 8 5 1 7 4	- 1 . 1 3 7 9 2 2 7	- 3 3 0 1 5 5 2 5
02 . 20	- 0 9 0 9 7 8 5 1	- 7 2 5 0 1 0 4 3	- 9 2 9 2 5 2 8 8	- 3 1 9 9 5 1 8 8
02 . 40	- 0 7 1 9 4 7 0 1	- 6 5 1 7 6 4 8 3	- 7 7 4 5 3 1 3 0	- 3 0 9 8 5 8 7 8
02 . 60	- 0 5 4 1 0 2 1 5	- 5 9 2 4 2 2 1 4	- 6 5 7 3 7 4 9 9	- 2 9 9 4 7 7 2 1
02 . 80	- 0 3 7 8 0 7 6	- 5 4 4 2 0 8 2 1	- 5 6 9 6 4 4 6 3	- 2 8 8 6 2 1 1 0
03 . 00	- 0 2 3 2 4 2 6 3	- 5 0 4 9 5 7 5 3	- 4 5 9 2 2 4 1	- 2 7 7 2 5 1 4 3
03 . 50	- 0 0 4 3 3 5 9 8	- 4 3 5 3 4 2 8 8	- 3 7 2 7 1 3 0 7	- 2 4 7 1 4 4 5 6
04 . 00	- 0 1 9 2 8 3 1 4	- 3 9 1 5 8 0 5 5	- 2 9 3 8 3 5 2	- 2 1 6 6 7 6 1 0
04 . 50	- 0 2 3 6 2 7 6 3	- 3 6 0 8 6 0 9 1	- 2 3 7 4 8 5 2 6	- 1 8 8 6 3 2 4 4
05 . 00	- 0 2 0 9 5 2 4 5	- 3 3 5 5 0 0 8 9	- 1 9 3 9 3 8 5 8	- 1 6 5 0 4 5 4 3
07 . 50	- 0 0 2 2 6 7 5 3	- 2 2 9 6 2 1 3 2	- 0 8 0 6 3 0 0 1	- 1 0 8 9 0 6 0 1
10 . 00	- 0 0 2 2 4 7 5 6	- 1 7 3 3 1 0 5 9	- 0 4 3 9 1 7 3	- 0 8 2 5 3 2 4 0
15 . 00	- 0 0 0 2 1 6 5 1 4	- 1 1 2 1 0 4 8 5	- 0 2 0 1 4 6 7 3	- 0 5 6 8 6 0 5 1
20 . 00	- 0 0 0 1 0 5 5 3	- 0 8 5 2 7 5 5 9	- 0 1 1 3 2 6 2 9	- 0 4 2 1 2 3 6 0

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 2.0$

Ω	\bar{C}_{Mh}	$* C_{Mh}$	\bar{C}_{Ma}	$* C_{Ma}$
00. 01	-20419112	-98 . 012801	-26136 . 808	-59 . 898672
00. 02	-20417680	-49 . 004563	-6534 . 0030	-29 . 951153
00. 03	-20415293	-32 . 667667	-2903 . 8539	-19 . 969454
00. 04	-20411953	-24 . 498607	-1633 . 3017	-14 . 979211
00. 06	-20402410	-16 . 328323	-725 . 76452	-9 . 9901770
00. 08	-20389055	-12 . 241959	-408 . 12658	-7 . 4968692
00. 10	-20371892	-9 . 7891650	-261 . 10569	-6 . 0018503
00. 15	-20312368	-6 . 5159384	-115 . 90025	-4 . 012993
00. 20	-20229213	-4 . 8763107	-65 . 0788779	-3 . 0190140
00. 25	-20122608	-3 . 8901520	-41 . 5566436	-2 . 4260113
00. 30	-1992780	-3 . 2307591	-28 . 779437	-2 . 0326248
00. 35	-1984008	-2 . 7581224	-21 . 075957	-1 . 7532785
00. 40	-19664622	-2 . 4022417	-16 . 076764	-1 . 5451805
00. 50	-19247550	-1 . 9007679	-10 . 199548	-1 . 2571297
00. 60	-18745126	-1 . 5630574	-7 . 0093923	-1 . 0685817
00. 70	-18161618	-1 . 3191725	-5 . 0882841	-93669381
00. 80	-17501960	-1 . 1341757	-3 . 8438786	-84001681
00. 90	-15771691	-1 . 8868217	-2 . 931714	-7662091
01. 00	-15976901	-1 . 07975	-2 . 3870822	-70932245
01. 20	-14220443	-1 . 6925147	-1 . 6040241	-62622151
01. 40	-12289604	-1 . 56378995	-1 . 1397699	-56904785
01. 60	-10245502	-1 . 46759815	-1 . 84576805	-52691745
01. 80	-08150788	-1 . 39428874	-1 . 65078630	-49379204
02. 00	-06067097	-1 . 33797472	-1 . 51707595	-46610220
02. 20	-04052615	-1 . 29478156	-1 . 42302760	-44166313
02. 40	-02159885	-1 . 26196492	-1 . 35548865	-41942710
02. 60	-00433961	-1 . 23745555	-1 . 30605029	-39768215
02. 80	-01089034	-1 . 21960545	-1 . 26912344	-37687303
03. 00	-02382865	-1 . 20704599	-1 . 24088237	-35648681
03. 50	-04535923	-1 . 19150192	-1 . 19262073	-30730817
04. 00	05206297	-18775988	-15960693	-26216291
04. 50	04726939	-18623003	-13215844	-22345952
05. 00	03595722	-18163009	-10747541	-19278468
07. 50	00125441	-12152155	-3839747	-1278594
10. 00	-00447199	-09017883	-02003388	-0971233
15. 00	-00005184	-05521498	-01020634	-06673146
20. 00	-00006174	-04316605	-00560648	-04916632

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 2.0$

Ω	\bar{C}_{Lh}	C_{Lh}^*	$\bar{C}_{L\alpha}$	$C_{L\alpha}^*$	$C_{I,\alpha}^*$
00 . 01	- 1 69 2 0 2 0 7	- 1 63 7 8 9 6 3	- 4 1 2 8 8 6 4	- 3 9 2 4 2 1 5	- 3 9 2 4 2 1 5
00 . 02	- 1 69 1 9 3 1 7	- 8 1 8 9 3 5 4 5	- 1 0 3 2 2 0 2 7	- 1 9 6 2 2 2 2 9	- 1 9 6 2 2 2 2 9
00 . 03	- 1 69 1 7 8 3 4	- 5 4 5 9 4 2 8 7	- 4 5 8 7 4 6 4 8	- 1 3 0 8 2 7 3 2	- 1 3 0 8 2 7 3 2
00 . 04	- 1 69 1 5 7 5 9	- 4 0 9 4 4 2 3 5	- 2 5 8 0 3 6 8 0	- 9 0 1 3 3 5 7 0	- 9 0 1 3 3 5 7 0
00 . 05	- 1 69 0 9 8 2 9	- 2 7 2 9 3 3 8	- 1 1 4 6 7 2 7 5	- 6 5 4 4 7 2 9 0	- 6 5 4 4 7 2 9 0
00 . 06	-				
00 . 08	- 1 69 0 1 5 3 0	- 2 0 4 6 7 0 4 5	- 6 4 4 9 5 3 4	- 4 9 1 1 6 1 3	- 4 9 1 1 6 1 3
00 . 10	- 1 68 9 0 8 6 5	- 1 6 3 7 0 5 9 5	- 4 1 2 7 0 3 4	- 3 9 3 1 6 1 6 9	- 3 9 3 1 6 1 6 9
00 . 15	- 1 68 5 3 8 6 8	- 1 0 9 0 6 7 0 2	- 1 8 3 3 2 1 4 5	- 2 6 2 7 3 9 1 8	- 2 6 2 7 3 9 1 8
00 . 20	- 1 68 0 2 1 7 0	- 8 1 7 2 6 6 8 2	- 1 0 3 0 3 7 9 9	- 1 9 7 6 9 7 7 5	- 1 9 7 6 9 7 7 5
00 . 25	- 1 67 3 5 8 6 7	- 6 5 3 0 5 9 5 2	- 6 5 8 7 8 5 5 3	- 1 5 8 8 2 5 5 1	- 1 5 8 8 2 5 5 1
00 . 30	- 1 66 5 5 0 8 4	- 5 4 3 4 5 2 0 7	- 4 5 6 9 3 5 3 4	- 1 3 3 0 3 1 5 1	- 1 3 3 0 3 1 5 1
00 . 35	- 1 65 5 9 9 7 1	- 4 6 5 0 4 6 4 2	- 3 3 5 5 2 2 9 7 3	- 1 4 7 0 9 4 0	- 1 4 7 0 9 4 0
00 . 40	- 1 64 5 0 7 0 6	- 4 0 6 1 4 5 8 3	- 2 5 6 2 4 1 8 8	- 1 0 1 0 5 5 7 8	- 1 0 1 0 5 5 7 8
00 . 50	- 1 61 9 0 5 6 0	- 3 2 3 4 5 1 3	- 1 6 3 3 6 2 6 3	- 8 2 1 4 6 3 8 3	- 8 2 1 4 6 3 8 3
00 . 60	- 1 58 7 6 5 8 0	- 2 6 8 0 8 1 0 6	- 1 1 2 9 2 3 4 6	- 6 9 7 5 9 7 5 6	- 6 9 7 5 9 7 5 6
00 . 70	- 1 55 1 1 0 8 9	- 2 8 3 3 7 4 9	- 8 2 5 2 4 2 8 7	- 6 1 0 8 9 7 6 1	- 6 1 0 8 9 7 6 1
00 . 80	- 1 50 9 6 7 7 6	- 1 9 8 3 7 5 1 1	- 6 2 8 0 8 2 3 0	- 5 4 7 3 1 9 0 4	- 5 4 7 3 1 9 0 4
00 . 90	- 1 46 3 6 6 7 0	- 1 7 4 9 4 7 8 3	- 4 9 3 0 5 1 0 4	- 4 9 9 0 4 7 6 4	- 4 9 9 0 4 7 6 4
01 . 00	- 1 41 3 4 1 1 1	- 1 5 6 1 0 9 1 6	- 3 9 6 6 0 3 7 9	- 4 6 1 3 8 5 7 2	- 4 6 1 3 8 5 7 2
01 . 20	- 1 30 1 6 3 4 3	- 1 2 7 6 5 9 9 1	- 2 7 1 3 4 4 2 1	- 4 0 6 8 9 7 2 4	- 4 0 6 8 9 7 2 4
01 . 40	- 1 1 7 7 5 0 7 7	- 1 0 7 1 9 7 8 8	- 1 9 6 2 8 1 1 3	- 3 6 9 6 7 9 1 1	- 3 6 9 6 7 9 1 1
01 . 60	- 1 0 4 4 4 5 5 6	- 9 1 8 1 2 1 4 0	- 1 4 7 9 9 8 1 1	- 3 4 2 6 0 7 8 1	- 3 4 2 6 0 7 8 1
01 . 80	- 0 9 0 6 0 3 6 1	- 7 9 8 8 5 0 9 0	- 1 9 2 9 4 3 6	- 3 2 1 7 2 0 1 9	- 3 2 1 7 2 0 1 9
02 . 00	- 0 7 6 5 8 1 0 2	- 7 0 4 4 2 4 8 1	- 7 2 5 2 5 8 0 3 3	- 3 0 4 6 5 6 8 6	- 3 0 4 6 5 6 8 6
02 . 20	- 0 6 2 7 2 1 4 3	- 6 2 8 5 8 8 2 0 3	- 7 5 2 4 3 5 5	- 2 8 9 9 5 3 1 7	- 2 8 9 9 5 3 1 7
02 . 40	- 0 4 9 3 4 4 2 6	- 5 6 7 0 7 0 5 4	- 6 3 0 6 0 2 7 7	- 2 7 6 6 8 2 4 5	- 2 7 6 6 8 2 4 5
02 . 60	- 0 2 5 1 3 3 6 1	- 5 1 6 8 5 9 0 9	- 5 3 7 6 4 2 3	- 2 6 4 2 6 1 0 5	- 2 6 4 2 6 1 0 5
03 . 00	- 0 1 4 7 3 4 3 9	- 4 7 5 6 9 1 4 9	- 4 6 2 2 1 9 5 4	- 2 5 2 3 3 5 8 4	- 2 5 2 3 3 5 8 4
03 . 50	. 0 0 5 2 2 8 8 6	. 3 8 0 5 7 9 9 2	. 4 0 4 1 6 8 7 1	. 2 4 0 7 0 2 2 4	. 2 4 0 7 0 2 2 4
04 . 00	. 0 1 6 2 5 7 9 9	. 3 4 1 0 6 4 6 0	. 3 0 2 9 5 1 8 3	. 2 1 2 5 0 2 7 5	. 2 1 2 5 0 2 7 5
04 . 50	. 0 1 9 4 9 1 0 5	. 3 1 3 1 4 0 8 9	. 2 3 8 0 6 5 7 7	. 1 8 5 9 4 7 5 7	. 1 8 5 9 4 7 5 7
05 . 00	. 0 1 7 2 7 1 4 9	. 2 9 0 5 3 0 9 4	. 1 9 2 0 2 2 4 4	. 1 6 2 1 9 3 5 4	. 1 6 2 1 9 3 5 4
07 . 50	. 0 0 0 4 2 3 4 8	. 1 9 7 8 8 7 3 3	. 1 5 6 7 3 7 5 6	. 1 4 2 2 7 4 0 7	. 1 4 2 2 7 4 0 7
10 . 00	- 0 0 1 8 5 7 4 7	- 1 4 7 6 2 3 3 9	- 0 3 5 8 2 7 6 3	- 0 7 1 8 3 6 4 0	- 0 7 1 8 3 6 4 0
15 . 00	- 0 0 0 4 9 8 7 3	- 0 9 6 9 8 4 6 3	- 0 1 6 6 6 3 0 5	- 0 4 8 5 6 9 7 5	- 0 4 8 5 6 9 7 5
20 . 00	- 0 0 0 3 9 1 5 5	- 0 7 3 3 2 4 7 0	- 0 0 8 9 7 5 9 1	- 0 3 6 2 2 3 3 9	- 0 3 6 2 2 3 3 9

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 2.2$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-141000915	-81.894391	-20644.253	-60.000415
00.02	-14099126	-40.945926	-5160.9351	-30.001378
00.03	-14097484	-27.295874	-2293.6540	-20.002219
00.04	-14095200	-20.470426	-2290.1056	-15.00229
00.06	-14088678	-13.644152	-1573.2836	-10.004618
00.08	-14079550	-10.230141	-322.39833	-7.5061914
00.10	-14067819	-8.1810729	-306.27354	-6.0077572
00.15	-14027131	-5.4470241	-91.582623	-4.016528
00.20	-13970286	-4.0779172	-51.441147	-3.0155264
00.25	-13897402	-3.2548068	-32.861756	-2.4193762
00.30	-13808629	-2.7047159	-22.769646	-2.0231984
00.35	-13584150	-2.3106580	-16.684836	-1.7412739
00.40	-13584160	-2.0141433	-142.735984	-1.5307407
00.50	-13298790	-1.5967769	-8.0933073	-1.2381148
00.60	-12954800	-1.3161762	-5.5728998	-1.0452822
00.70	-12555024	-1.1138935	-4.0547460	-90934878
00.80	-12102715	-0.96072638	-3.0709876	-80885092
00.90	-11601533	-0.84046835	-2.3980999	-73185117
01.00	-1105504	-0.74340854	-1.9183394	-67117661
01.20	-09846607	-0.59626851	-1.2975391	-58203070
01.40	-08513947	-0.49027824	-0.92831314	-51980505
01.60	-07093190	-0.4098744	-0.69340475	-47365996
01.80	-05642111	-0.35024372	-0.53662891	-43757454
02.00	-04186946	-0.30324396	-0.42824561	-40796612
02.20	-02772811	-0.26676055	-0.35125723	-38260619
02.40	-01436246	-0.23855948	-0.29533777	-36007516
02.60	-0.209154	-0.21698217	-0.255389795	-33946516
02.80	-0.0882202	-0.20072993	-0.222556387	-32020599
03.00	-0.1817928	-0.18874095	-0.19834176	-30195660
03.50	-0.3407253	-0.17184320	-0.15660166	-25979948
04.00	-0.3938201	-0.16536295	-0.12845914	-22247045
04.50	-0.3609659	-0.16186595	-0.10585508	-19079399
05.00	-0.2753503	-0.15696458	-0.08604084	-16549184
07.50	-0.0247022	-0.10378179	-0.02985978	-11032335
10.00	-0.0324324	-0.07531876	-0.01668830	-0.8453943
15.00	-0.0086297	-0.04849869	-0.00867195	-0.567331
20.00	-0.0065760	-0.03705195	-0.00422782	-0.4229570

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 2.2$

Ω	\bar{C}_{Lh}	C_{Lh}^*	$\bar{C}_{L\alpha}$	$C_{L\alpha}^*$
00.01	-1.2260047	-14.123759	-34.1818905	-40.947725
00.02	-1.2259408	-70.617873	-85.4537605	-20.474636
00.03	-1.2258342	-47.077561	-37.978741	-13.650617
00.04	-1.2256849	-35.0307098	-21.362482	-10.238866
00.05	-1.2252587	-23.536023	-9.4937262	-6.8276299
00.06	0.08	-1.2246620	-17.649874	-5.3396620
00.10	-1.2238953	-14.0117695	-34.1.69241	-4.0998767
00.15	-1.222354	-9.0676042	-21.79252	-2.7375401
00.20	-1.2175184	-9.0469698	-8.51.327761	-0.576477
00.25	-1.2127510	-5.6342926	-54.564306	-1.6507245
00.30	-1.2069418	-4.68941679	-37.853536	-1.3802768
00.35	-1.2001013	-4.0147679	-21.238390	-1.1878057
00.40	-1.1922419	-3.5068014	-13.548853	-0.4406051
00.50	-1.1735252	-2.7948273	-13.548853	-0.4423798
00.60	-1.1509264	-2.3184172	-9.3727649	-7.1254269
00.70	-1.1246076	-1.9767169	-6.8556807	-6.1970455
00.80	-1.0947568	-1.7193127	-5.22229702	-5.5107902
00.90	-1.0615858	-1.5182080	-4.1045612	-4.985237
01.00	-1.0253284	-1.3566130	-3.055318	-3.4714204
01.20	-0.9445862	-1.128064	-2.2672788	-3.9647230
01.40	-0.8547520	-0.93759816	-1.6444504	-3.5433509
01.60	-0.7582421	-0.80587130	-1.2432256	-3.23333657
01.80	-0.6557579	-0.70367236	-0.97091475	-2.9936333
02.00	-0.5553042	-0.62260625	-0.7861364	-2.795797
02.20	-0.4538851	-0.55728998	-0.63850284	-2.635803
02.40	-0.3556383	-0.50408179	-0.53378472	-2.4923492
02.60	-0.2626530	-0.46039979	-0.45381407	-2.3627242
02.80	-0.1767307	-0.42433579	-0.39157110	-2.2426955
03.00	-0.0993371	-0.39442692	-0.34227808	-2.1295812
03.50	-0.0505745	-0.33951332	-0.25595882	-1.8682921
04.00	0.00	0.1346082	-0.30331683	-0.20055656
04.50	0.00	0.1594488	-0.27751055	-0.16144672
05.00	0.00	0.1412114	-0.25684132	-0.13170016
07.50	0.00	0.0173108	-0.17423752	-0.05389756
10.00	0.00	-0.00128644	-0.12893701	-0.03046248
15.00	0.00	-0.00067990	-0.08581543	-0.01418174
20.00	0.00	-0.00043523	-0.06438860	-0.00754892

Table 1208.2 AEROdynamic FLUTTER COEFFICIENTS (Continued), Lift, $M = 2.4$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-10216649	-70.618486	-17090.891	-57.662911
00.02	-10215945	-35.308324	-4272.6345	-28.832261
00.03	-10214773	-23.537861	-1898.8833	-19.222402
00.04	-10213132	-17.652323	-1068.0704	-14.41741
00.05	-1020843	-11.766173	-474.63260	-9.6136162
00.06	-1020843	-11.766173	-474.63260	-9.6136162
00.08	-10201880	-8.8224867	-266.92942	-7.2120898
00.10	-10193447	-7.0557865	-170.79256	-5.7716020
00.15	-10166194	-4.6987675	-75.842737	-3.8521961
00.20	-10123323	-3.5187485	-42.610535	-2.8938190
00.25	-10070915	-2.8095436	-27.229031	-2.3198433
00.30	-10007076	-2.3357607	-18.873919	-1.9380576
00.35	-09931932	-1.9965203	-13.836334	-1.6660836
00.40	-09845634	-1.7413849	-10.567037	-1.4627303
00.50	-09640286	-1.3825637	-6.7231480	-1.1794977
00.60	-09392666	-1.1416353	-4.6361647	-0.99222938
00.70	-09104739	-0.96819245	-3.3788575	-0.85971262
00.80	-08778777	-0.83704681	-2.5639017	-0.76132976
00.90	-08417341	-0.73132427	-2.0062510	-0.68561746
01.00	-08023250	-0.65132427	-1.6084329	-0.62569052
01.20	-07149526	-0.52582930	-1.0930776	-0.53710253
01.40	-06184277	-0.43550282	-0.78584706	-0.47484741
01.60	-05156364	-0.36784265	-0.58971303	-0.42853960
01.80	-04095730	-0.31589498	-0.45820813	-0.39240778
02.00	-03032266	-0.27545181	-0.36675723	-0.36300725
02.20	-01994722	-0.24377912	-0.30133160	-0.33817878
02.40	-01009688	-0.21898419	-0.25342448	-0.31652617
02.60	-00100695	-0.19967874	-0.21760496	-0.29713264
02.80	-00712520	-0.18479061	-0.19028780	-0.26293628
03.00	-01415123	-0.17345505	-0.16900985	-0.22595640
03.50	-02625076	-0.15618122	-0.13211508	-0.22595640
04.00	-03049795	-0.14813595	-0.10746927	-0.19407216
04.50	-02814223	-0.14335196	-0.08817602	-0.16725884
05.00	-02150152	-0.13815262	-0.07163603	-0.14574223
07.50	-0.00405807	-0.09065714	-0.02455477	-0.09748092
10.00	-0.00202888	-0.06481550	-0.01455025	-0.07506921
15.00	-0.00101579	-0.04337622	-0.00743542	-0.04962161
20.00	-0.00067786	-0.03236456	-0.00353965	-0.03735068

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 2.4$

Ω	\bar{C}_{Lh}	C_{Lh}^*	\bar{C}_{La}	C_{La}^*
00.01	-0.09210196	-1.2452355	-2.9228.459	-40.643626
00.02	-0.09209719	-62.261082	-7307.0451	-20.322373
00.03	-0.09208923	-41.506621	-3247.5241	-13.548672
00.04	-0.09207809	-31.129160	-1826.6917	-10.162307
00.05	-0.09204626	-20.751239	-811.81151	-6.776116
00.06	-0.09204426	-	-	-
00.08	-0.09200172	-15.561819	-456.60345	-5.0833941
00.10	-0.09194447	-12.247800	-292.19289	-4.0680587
00.15	-0.09174587	-8.2470240	-122.81219	-2.7151449
00.20	-0.09146833	-6.2170240	-72.979099	-2.0396121
00.25	-0.09111233	-4.9695138	-46.673662	-1.6350256
00.30	-0.09067850	-4.1370994	-32.384464	-1.3659057
00.35	-0.09016762	-3.5418925	-23.768711	-1.1741886
00.40	-0.08958057	-3.0949505	-18.176942	-1.0308413
00.50	-0.08818228	-2.4679817	-11.601539	-0.83118583
00.60	-0.08649344	-2.04866763	-8.0305955	-0.69918445
00.70	-0.08452587	-1.7481111	-5.8778049	-0.60579079
00.80	-0.08229330	-1.5218344	-4.813934	-0.53647464
00.90	-0.07981117	-1.351590	-3.5241720	-0.48315804
01.00	-0.07709660	-1.2032789	-2.8411120	-0.44098960
01.20	-0.07104557	-0.98937973	-1.9524937	-0.37876131
01.40	-0.06430312	-0.83577544	-1.4190057	-0.3519388
01.60	-0.05704692	-0.72030976	-1.0749386	-0.30296359
01.80	-0.04946324	-0.63067598	-0.84105958	-0.27801706
02.00	-0.04174044	-0.55947499	-0.67557624	-0.25790099
02.20	-0.03406268	-0.50196994	-0.55472435	-0.24108668
02.40	-0.026660392	-0.45496507	-0.46416249	-0.22657346
02.60	-0.01952252	-0.41620402	-0.39480754	-0.21369538
02.80	-0.01295661	-0.38402826	-0.34067333	-0.20200602
03.00	-0.00702043	-0.35707448	-0.29768256	-0.19120803
03.50	-0.00455812	-0.30727170	-0.22216445	-0.16701438
04.00	-0.01112201	-0.27379727	-0.17363582	-0.14593376
04.50	-0.01307697	-0.24971825	-0.13951911	-0.12776021
05.00	-0.01157608	-0.23054777	-0.11374170	-0.11262121
07.50	-0.00229737	-0.15569626	-0.04649770	-0.07459467
10.00	-0.00078436	-0.11476600	-0.0263555	-0.05749734
15.00	-0.00063021	-0.07706564	-0.01231412	-0.03800379
20.00	-0.00028201	-0.05749754	-0.00661221	-0.02870482

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 2.6$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00. 01	-0.07675121	-62.261543	-14614.191	-54.623766
00. 02	-0.07674596	-31.230081	-3653.4839	-27.312465
00. 03	-0.07673720	-20.752601	-1623.7234	-18.208956
00. 04	-0.07672495	-15.563659	-913.30719	-13.657396
00. 06	-0.07668994	-10.374239	-405.86708	-9.106234
00. 08	-0.07664094	-7.779068	-228.26307	-6.8310243
00. 10	-0.07657798	-6.2216001	-146.05782	-5.4662141
00. 15	-0.07635956	-4.1439092	-64.867561	-3.6473666
00. 20	-0.0760438	-3.1039295	-36.451140	-2.7389009
00. 25	-0.07566303	-2.4790447	-23.298583	-2.1945809
00. 30	-0.07518627	-2.0617183	-16.154180	-1.8323260
00. 35	-0.07462503	-1.763084	-11.846535	-1.5741003
00. 40	-0.07398041	-1.5384454	-9.0509155	-1.3808847
00. 50	-0.07244619	-1.2228291	-5.7638461	-1.1114407
00. 60	-0.07059551	-1.0111263	-3.9790371	-0.93293596
00. 70	-0.06844270	-0.85889030	-2.9036298	-0.8633573
00. 80	-0.06600434	-0.74390897	-2.2064308	-0.71211449
00. 90	-0.06329912	-0.65385147	-1.7292123	-0.63941819
01. 00	-0.06034767	-0.58132650	-1.3886299	-0.58172920
01. 20	-0.05379697	-0.47165196	-0.94703827	-0.49614727
01. 40	-0.04654788	-0.39277177	-0.68331280	-0.43576975
01. 60	-0.03881278	-0.33365175	-0.51451505	-0.39077701
01. 80	-0.03081291	-0.2883824	-0.40094135	-0.35571122
02. 00	-0.02277026	-0.2525869	-0.32160740	-0.32730931
02. 20	-0.01489969	-0.2454114	-0.26454552	-0.30351703
02. 40	-0.00740148	-0.20237272	-0.22250466	-0.28299489
02. 60	-0.0045472	-0.18488414	-0.19087077	-0.26485046
02. 80	-0.00578826	-0.17116080	-0.16658835	-0.24848363
03. 00	-0.01206118	-0.16047362	-0.14756809	-0.23349193
03. 50	-0.02065543	-0.14331415	-0.11442843	-0.20051150
04. 00	-0.02409166	-0.13439067	-0.09242993	-0.17263753
04. 50	-0.02234181	-0.12877905	-0.07554637	-0.14938179
05. 00	-0.01708841	-0.12336089	-0.06134945	-0.13066937
07. 50	-0.004588942	-0.080588260	-0.02100806	-0.08757844
10. 00	-0.00108694	-0.05708455	-0.01300626	-0.06760812
15. 00	-0.00088499	-0.03916046	-0.00643320	-0.04427652
20. 00	-0.00041776	-0.02875961	-0.00317421	-0.03354327

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 2.6$

Ω	\bar{C}_{Lh}	C_{Lh}^*	\bar{C}_{La}	C_{La}	$* C_{La}$
0.0 .01	- .0711 7353	- 111 .60166	- 25583 .549	- 39 .48520	03
0.0 .02	- .0711 6986	- 15 .800294	- 6395 .8351	- 19 .74302	2
0.0 .03	- .0711 6374	- 37 .199603	- 2842 .5546	- 13 .16248	3
0.0 .04	- .0711 5517	- 27 .899080	- 1598 .9065	- 9 .87235	29
0.0 .05	- .0711 3070	- 18 .598201	- 710 .58640	- 6 .58250	36
0.0 .06	- .0710 9644	- 13 .947406	- 399 .67439	- 4 .93785	90
0.0 .10	- .0710 5242	- 11 .156646	- 255 .76656	- 3 .95129	61
0.0 .15	- .0708 9969	- 7 .4348070	- 113 .63545	- 2 .63653	00
0.0 .20	- .0708 6826	- 5 .452343	- 63 .89676	- 1 .97984	10
0.0 .25	- .0704 1247	- 4 .4552343	- 40 .864613	- 1 .58637	83
0.0 .30	- .0700 7881	- 3 .7094783	- 28 .357302	- 1 .32452	40
0.0 .35	- .0696 8585	- 3 .1763120	- 20 .815925	- 1 .13786	95
0.0 .40	- .0692 3427	- 2 .7760220	- 15 .921420	- 9 .82096	3
0.0 .50	- .0681 5848	- 2 .2146486	- 10 .165870	- 8 .03460	78
0.0 .60	- .0668 5884	- 1 .8393728	- 7 .0399070	- 6 .74457	26
0.0 .70	- .0653 4426	- 1 .5704960	- 5 .1555713	- 5 .82984	03
0.0 .80	- .0636 62509	- 1 .3681765	- 3 .9330910	- 5 .14928	37
0.0 .90	- .0617 1300	- 1 .2102863	- 3 .0954882	- 4 .62445	63
0.1 .00	- .0596 2092	- 1 .0835537	- 2 .4968766	- 4 .20825	59
0.1 .20	- .0549 5388	- .89261059	- 1 .7185098	- 3 .59170	97
0.1 .40	- .0497 4736	- 75557588	- 1 .2509220	- 3 .15802	18
0.1 .60	- .0441 3630	- 65258371	- 9 .4908447	- 2 .83622	57
0.2 .00	- .0382 6260	- 57260054	- 74 .366203	- 2 .58684	93
0.2 .20	- .0322 2029	- 50896058	- 59809058	- 2 .38625	13
0.2 .40	- .0263 0082	- 45753012	- 49158564	- 2 .21949	2
0.2 .60	- .0204 8856	- 41534842	- 4160932	- 2 .07679	12
0.2 .80	- .0149 5668	- 38044174	- 35022467	- 1 .95154	68
0.3 .00	- .0098 1361	- 35133960	- 30220355	- 1 .83927	50
0.3 .50	- .0051 5015	- 32692769	- 26398638	- 1 .73690	00
0.4 .00	- .0039 9595	- 28111950	- 19667470	- 1 .51229	6
0.4 .50	- .0004 22724	- 24994830	- 15337538	- 1 .32112	40
0.5 .00	- .0107 9551	- 22733882	- 12303583	- 1 .15842	28
0.7 .50	- .0024 7246	- 20939733	- 10024450	- 1 .02333	33
1.0 .00	- .0004 0360	- 10364872	- 02374173	- 0 .52372	4
1.0 .00	- .0004 9691	- 6997122	- 01086416	- 0 .34447	19
2.0 .00	- .0001 0207	- 5204393	- 00592356	- 0 .26084	85

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 2.8$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-0.5931095	-55.800650	-12791.746	-51.504728
00.02	-0.5930691	-27.899791	-3197.886	-25.752800
00.03	-0.5930018	-18.599268	-1421.2484	-17.169018
00.04	-0.5929075	-13.948828	-799.42433	-12.877273
00.05	-0.5926383	-9.2980332	-355.26429	-8.5858176
00.06	-0.5847410	-2.2232025	-20.403713	-2.0674096
00.08	-0.5922615	-6.9722807	-199.80830	-6.4403803
00.10	-0.5917773	-5.5765457	-127.85441	-5.153499
00.15	-0.590977	-3.7147417	-56.788918	-3.437837
00.20	-0.5877508	-2.7829634	-31.916125	-2.5810190
00.25	-0.5847410	-2.2232025	-20.403713	-2.0674096
00.30	-0.5767570	-1.5820205	-10.379688	-1.4816271
00.40	-0.5717982	-1.3810338	-7.932738	-1.2990837
00.50	-0.5599359	-1.0986952	-5.0553303	-1.0443168
00.60	-0.5457509	-0.90947051	-3.4929184	-0.87531667
00.70	-0.5291773	-773511906	-2.5514137	-7.5528101
00.80	-0.5103982	-67093062	-1.9409257	-6.6580256
00.90	-0.4895547	-59065100	-1.5229599	-5.96650217
01.00	-0.4668027	-52605326	-1.2245674	-5.4168137
01.20	-0.4162613	-42845951	-0.83741686	-4.5994794
01.40	-0.3602564	-35831604	-60588331	-4.0213956
01.60	-0.3004019	-30572492	-45739053	-3.5900912
01.80	-0.23759034	-23538267	-35724667	-3.2541667
02.00	-0.1146108	-20817497	-28698266	-2.9828605
02.20	-0.0560580	-1809933	-23626389	-2.7567550
02.40	-0.0016423	-17209988	-19872059	-2.5631218
02.60	-0.0474348	-15937757	-17032954	-2.3934041
02.80	-0.0902014	-14930170	-14842909	-2.2417653
03.00	-0.1654560	-13250737	-13120036	-2.1042045
03.50	-0.1935740	-12312403	-10106697	-1.8060997
04.00	-0.1802001	-11699600	-9815296	-1.5581376
04.50	-0.1379317	-11144488	-66610589	-1.3526931
05.00	-0.0460352	-0.7261449	-0.5366398	-1.1871304
07.50	-0.00042228	-0.5118396	-0.1179878	-0.6154653
15.00	-0.00066761	-0.3559996	-0.0562587	-0.4012481
20.00	-0.00013376	-0.2594736	-0.0293451	-0.3048169

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 2.8$

Ω	\bar{C}_{Lh}	C_{Lh}^*	\bar{C}_{La}	C_{La}^*
00 . 01	- 0 562 688 81	- 1 01 . 2 85 30	- 2 27 89 . 2 03	- 37 . 9 82 3 11
00 . 02	- 0 562 659 91	- 50 . 6 42 230	- 56 97 . 2 603	- 18 . 9 91 4 81
00 . 03	- 0 562 611 0	- 33 . 7 61 018	- 25 32 . 0 857	- 12 . 6 61 3 49
00 . 04	- 0 562 535 8	- 25 . 320 271	- 14 24 . 2 746	- 9 . 4 96 3 910
00 . 05	- 0 562 535 08	- 16 . 879 243	- 63 2 . 9 8101	- 6 . 3 31 6 500
00 . 06	- 0 562 535 08	- 12 . 658 449	- 35 6 . 0 2825	- 4 . 7 49 4 9 60
00 . 08	- 0 562 081 0	- 10 . 748	- 227 . 8 3871	- 3 . 8 00 3 765
00 . 10	- 0 561 734 4	- 6 . 748	- 101 . 2 3181	- 2 . 535 3 872
00 . 15	- 0 561 5317	- 5 . 058 6726	- 56 . 9 1943	- 1 . 9 03 4 290
00 . 20	- 0 558 8509	- 4 . 044 293	- 36 . 4 09302	- 1 . 5 24 6798
00 . 25	- 0 556 6948	- 3 . 367 8141	- 25 . 2 68070	- 1 . 2 72 53 15
00 . 30	- 0 554 0670	- 2 . 884 1350	- 18 . 5 50363	- 1 . 0 92 7226
00 . 35	- 0 554 09721	- 2 . 521 0472	- 14 . 1 90420	- 1 . 9 581 2194
00 . 40	- 0 547 4152	- 2 . 011 9586	- 9 . 0 634259	- 770 2 8047
00 . 50	- 0 538 9406	- 1 . 671 7530	- 6 . 2787842	- 64 56 94 36
00 . 60	- 0 528 7005	- 1 . 051 67641	- 4 . 600 1348	- 55 72 2470
00 . 70	- 0 503 2115	- 1 . 244 8299	- 3 . 511 0324	- 4 91 2 9803
00 . 80	- 0 481 3333	- 1 . 018 674	- 2 . 764 528	- 4 40 3 7029
01 . 00	- 0 471 6297	- 981 716271	- 2 . 231 3453	- 3 99 912 36
01 . 20	- 0 434 7903	- 814 43176	- 1 . 537 5954	- 3 398 82869
01 . 40	- 0 393 6528	- 690 53235	- 1 . 120 6330	- 2 9 74 53 08
01 . 60	- 0 349 2691	- 597 42838	- 8 512 8126	- 2 6 591 3 08
01 . 80	- 0 302 7476	- 525 10299	- 667 78981	- 2 41 471 34
02 . 00	- 0 255 2170	- 467 53878	- 537 59999	- 2 21 836 95
02 . 20	- 0 207 7899	- 4 208 9117	- 4 422 0895	- 2 055 7205
02 . 40	- 0 161 5280	- 3 825 7579	- 370 45896	- 1 91 72 9 89
02 . 60	- 0 117 4099	- 350 77818	- 315 28967	- 1 79 669 77
02 . 80	- 0 076 3034	- 324 17479	- 272 05235	- 1 689 5035
03 . 00	- 0 038 9422	- 301 76692	- 237 58305	- 1 592 6502
03 . 50	- 0 034 6549	- 259 38412	- 1 767 3988	- 1 383 3474
04 . 00	- 0 007 0525	- 2 301 9986	- 1 375 6631	- 1 208 3 863
04 . 50	- 0 008 98340	- 2 088 7527	- 1 101 91916	- 1 061 0 384
05 . 00	- 0 007 94719	- 1 919 8125	- 0 897 3122	- 0 9390548
07 . 50	- 0 024 4600	- 1 292 2633	- 0 368 3936	- 0 623 3746
10 . 00	- 0 001 3436	- 0 946 8064	- 0 214 5984	- 0 481 1509
15 . 00	- 0 000 35068	- 0 640 9111	- 0 097 1385	- 0 315 7571
20 . 00	- 0 000 3675	- 0 476 2340	- 0 053 9899	- 0 239 2 277

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, M = 3.0

Ω	\bar{C}_{Mh}	\bar{C}_{Mh}^*	\bar{C}_{Ma}	\bar{C}_{Ma}^*
00.01	-0.46890442	-50.642511	-11394579	-48.532901
00.02	-0.4688723	-25.320834	-2848.6079	-24.266787
00.03	-0.4688193	-15.880087	-1266.0206	-16.178232
00.04	-0.4687451	-12.659573	-112.1505	-12.134067
00.05	-0.4685331	-8.4387780	-316.46825	-8.0901259
00.06	-0.4682365	-6.3280998	-177.99188	-6.0683795
00.08	-0.4678551	-5.0614688	-113.89712	-4.8555106
00.10	-0.4665325	-3.3719759	-50.593725	-3.2388726
00.15	-0.4646843	-2.5265363	-28.437635	-2.4311081
00.20	-0.4623140	-2.0187242	-18.182635	-1.9468890
00.25	-0.4594261	-1.6797323	-12.612131	-1.6244382
00.30	-0.4560259	-1.2550042	-9.2534913	-1.3944219
00.35	-0.4521199	-0.9991549	-7.0735913	-1.2221726
00.40	-0.4428206	-0.8277960	-4.5104569	-0.9816379
00.50	-0.4315976	-0.61200367	-3.1185741	-0.8219320
00.60	-0.43037289	-0.53946378	-1.7357872	-0.62364422
00.70	-0.4185347	-0.70476959	-2.2797596	-0.70838232
00.80	-0.4037289	-0.61200367	-1.3632906	-0.55807921
00.90	-0.3872897	-0.53946378	-1.0972900	-0.50590104
01.00	-0.3693381	-0.48113367	-0.75198121	-0.42819341
01.20	-0.3294321	-0.39307989	-0.21380082	-0.25278279
01.40	-0.2851644	-0.32983164	-0.54524286	-0.37313536
01.60	-0.2377931	-0.28239946	-0.41243938	-0.33202131
01.80	-0.1863668	-0.24578320	-0.22264606	-0.30021226
02.00	-0.1390283	-0.21698992	-0.25953341	-0.27421026
02.20	-0.0902691	-0.19406789	-0.21380082	-0.25278279
02.40	-0.0435865	-0.17570266	-0.17982284	-0.23452437
02.60	-0.0000935	-0.16094794	-0.15402679	-0.21861968
02.80	-0.0392442	-0.14909294	-0.13405109	-0.20450730
03.00	-0.0736364	-0.13958124	-0.11828291	-0.19179692
03.50	-0.1345844	-0.12327720	-0.09061830	-0.16456918
04.00	-0.1578444	-0.11369544	-0.07239529	-0.14221099
04.50	-0.1473772	-0.10726312	-0.05879771	-0.12379931
05.00	-0.1128685	-0.10165201	-0.04771721	-0.10894970
07.50	-0.0437454	-0.06615507	-0.01661429	-0.07315360
10.00	-0.00002234	-0.04653532	-0.01080753	-0.05651112
15.00	-0.00045086	-0.03256799	-0.00497682	-0.03678860
20.00	-0.0007811	-0.02370476	-0.00273715	-0.02795077

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 3.0$

Ω	\bar{C}_{Lh}	$* C_{Lh}$	$\bar{C}_{L\alpha}$	$* C_{L\alpha}$
0.0 .01	- .0 453 3094	- 9 2 .8 391 28	- 20 577 .3 38	- 36 .3 72 3 00
0.0 .02	- .0 453 2862	- 4 6 .4 192 28	- 51 44 .3 025	- 18 .1 86 4 07
0.0 .03	- .0 453 2475	- 3 0 .9 457 72	- 22 86 .3 330	- 12 .1 24 5 57
0.0 .04	- .0 453 1933	- 2 3 .2 089 32	- 12 86 .0 436	- 9 .0 937 1 62
0.0 .05	- .0 453 0386	- 1 5 .4 718 66	- 57 1 .5 512 5	- 6 .0 630 5 04
0.0 .06	- .0 453 0386	- 1 5 .4 718 66	- 57 1 .5 512 5	- 6 .0 630 5 04
0.0 .08	- .0 452 8220	- 1 1 .6 031 07	- 32 1 .4 78 93	- 4 .5 478 8 77
0.0 .10	- .0 452 5436	- 9 .2 81 670 9	- 20 5 .7 31 18	- 3 .6 389 2 70
0.0 .15	- .0 451 5879	- 6 .1 85 897 3	- 91 .4 124 62	- 2 .4 227 3 74
0.0 .20	- .0 450 2282	- 4 .6 37 450 8	- 51 .4 009 80	- 1 .8 220 2 70
0.0 .25	- .0 448 4967	- 3 .7 07 939 3	- 32 .8 81 455	- 1 .4 591 5 36
0.0 .30	- .0 446 3864	- 3 .0 87 899 9	- 22 .8 215 46	- 1 .217 51 58
0.0 .35	- .0 443 9008	- 2 .6 44 7064	- 16 .7 558 21	- 1 .0 4515 24
0.0 .40	- .0 441 0441	- 2 .3 12 0465	- 12 .8 190 16	- 9 .1 608 246
0.0 .50	- .0 434 2368	- 1 .8 457 051	- 8 .1 895 701	- 7 3585 906
0.0 .60	- .0 426 0102	- 1 .5 341 1549	- 5 .6 751 185	- 6 1 621 8 09
0.0 .70	- .0 416 4189	- 1 .3 11 092 6	- 4 .1 593 0 06	- 5 311 72 53
0.0 .80	- .0 405 5264	- 1 .1 43 371 7	- 3 .1 757 966	- 4 6 772 569
0.0 .90	- .0 393 4046	- 1 .0 12 581 3	- 2 .5 01 829 7	- 4 1 865 4 64
0.1 .00	- .0 380 1330	- 9 .0 76 778 7	- 2 .0 306 626	- 3 7 962 3 50
0.1 .20	- .0 350 4926	- 7 .4 97 754 9	- 1 .3 933 539	- 3 215 5650
0.1 .40	- .0 317 3680	- 6 .3 65 631 9	- 1 .0 165 3 37	- 2 8 04 97 4 8
0.1 .60	- .0 281 6663	- 5 .5 15 597 8	- 7 .2 81 970 82	- 2 262 051 9
0.1 .80	- .0 244 0618	- 4 .8 54 1299	- 6 .6 91 662	- 2 071 696 4
0.2 .00	- .0 205 6671	- 4 .3 27 7500	- 4 .8 898 109	- 1 914 384 0
0.2 .20	- .0 167 3046	- 3 .90 06797	- 4 .0 2465 52	- 1 471 652 5
0.2 .40	- .0 129 8289	- 3 .5 49 273 8	- 3 .3 730 298	- 1 781 0 204
0.2 .60	- .0 094 0317	- 3 .2 56 9634	- 3 .8 71 2556	- 1 665 4 236
0.2 .80	- .0 060 6188	- 3 .0 11 6957	- 2 .4 77 4193	- 1 563 3 049
0.3 .00	- .0 030 1917	- 2 .8 04 4075	- 2 .1 630 0 41	- 1 471 652 5
0.3 .50	.0 029 9616	.2 409 97571	.1 607 0116	.1 2758 542
0.4 .00	.0 648 175	.2 135 3086	.1 248 7566	.1 114 491 2
0.4 .50	.0 075 3757	.1 933 4757	.0 98 896 94	.0 979 780 0
0.5 .00	.0 066 6654	.1 773 6910	.0 813 0819	.0 868 566 2
0.7 .50	-.0 023 2075	-.1 192 0063	-.0 3350 458	-.0 5770 469
1.0 .00	.0 000 4767	.0 872 7788	.0 1 960 4 36	.0 4451 644
1.5 .00	.0 002 2036	.0 591 3934	.0 0878 4887	.0 29196 38
2.0 .00	.0 001 2198	.0 439 6208	.0 04954 26	.0 22102 97

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 3.2$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	$* C_{Ma}$
00.01	-0.3777558	-4.6•419451	-1.0288•652	-4.5•783510
00.02	-0.3777303	-2.3•209385	-1.2572•1337	-2.2•892021
00.03	-0.3776877	-1.5•472546	-1.143•1489	-1.5•261643
00.04	-0.3776281	-1.1•604013	-1.643•00426	-1.1•446543
00.05	-0.3774579	-7.7352535	-2.85•75807	-7.6316193
00.06	-0.3774579	-5•8006476	-1.60•72192	-5•7243348
00.08	-0.3772196	-4•6397035	-1.02•84806	-4•5801054
00.10	-0.3769135	-3•0912533	-4.5•688740	-3•0548776
00.15	-0.3758514	-2•3164696	-2.5•6835056	-2.2927018
00.20	-0.374638	-1•8511575	-1.6•4233567	-1.8357437
00.25	-0.3724638	-0.3701445	-1.1•5405864	-1.1•393501
00.30	-0.3674437	-1•3674276	-1.1•3607424	-1.1•3142379
00.40	-0.3642765	-1•1515760	-6•3924603	-1.1•1515809
00.50	-0.3568066	-9.1735319	-4•0780228	-9.2434566
00.60	-0.3477898	-7.6056503	-2•8211422	-7.7337205
00.70	-0.3372926	-6.4806700	-2•0636352	-6.6594893
00.80	-0.3253917	-5.6329241	-1•5723394	-5.8571759
00.90	-0.3121740	-4.9704200	-1•2358630	-5.2358680
01.00	-0.2977355	-4.4379980	-1•9955394	-4.7409941
01.20	-0.2656207	-3.6348154	-6.8341518	-4.0031317
01.40	-0.2299639	-3.0582069	-4.9638099	-3.4796577
01.60	-0.1917673	-2.6297185	-3.7607893	-3.0885046
01.80	-0.1520829	-2.2915497	-2.9459588	-2.7840554
02.00	-0.1119774	-2.0281282	-2.3719743	-2.5389793
02.20	-0.0724959	-1.8177402	-1.9549546	-2.3359721
02.40	-0.0346277	-1.6483537	-1.6441971	-2.1636221
02.60	-0.0007250	-1.5113796	-1.4075243	-2.0141782
02.80	-0.0327743	-1.4004056	-1.2236827	-1.8823672
03.00	-0.0608691	-1.3104489	-1.0781655	-1.7641167
03.50	-0.1109427	-1.1528767	-0.8222082	-1.5133181
04.00	-0.1303728	-1.0567335	-0.6540190	-1.3095405
04.50	-0.1220223	-0.9908216	-0.5298008	-1.1426290
05.00	-0.0934878	-0.9346769	-0.4298542	-1.0079621
07.50	-0.0404314	-0.6081009	-0.1515688	-0.6769622
10.00	-0.00030733	-0.4277200	-0.0996963	-0.5225588
15.00	-0.00266660	-0.2997552	-0.0445325	-0.3403103
20.00	-0.0020425	-0.2187262	-0.0255404	-0.2581871

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 3.2$

Ω	\bar{C}_{Lh}	C_{Lh}^*	\bar{C}_{La}	C_{La}^*
0.0 .01	-0.37102881	-85.782981	-18781.280	-34.768315
0.0 .02	-0.3710092	-42.891212	-4695.2942	-17.384365
0.0 .03	-0.3709776	-28.593832	-2086.7783	-11.589807
0.0 .04	-0.3709334	-21.445050	-1173.7977	-8.6925975
0.0 .05	-0.3708071	-14.296082	-521.66876	-5.7955259
0.0 .06	-0.3706303	-10.721412	-293.42363	-4.3471282
0.0 .08	-0.3704030	-8.5764631	-187.77875	-3.4781999
0.0 .10	-0.3696148	-5.7161005	-83.438170	-2.3199497
0.0 .15	-0.3685130	-4.2854611	-46.919022	-1.7441669
0.0 .20	-0.3670996	-3.4267144	-30.015934	-1.3941688
0.0 .25	-0.3653768	-2.8539176	-20.834074	-1.1630608
0.0 .30	-0.36333476	-2.4445248	-15.297768	-1.998173024
0.0 .40	-0.3610153	-2.1372632	-11.704561	-87467099
0.0 .50	-0.3554573	-1.7065913	-7.4791385	-70215063
0.0 .60	-0.3487395	-1.4189391	-5.1840964	-58754699
0.0 .70	-0.3409059	-1.2130418	-3.8005135	-50602006
0.0 .80	-0.3320080	-1.0582708	-2.9027727	-44514734
0.0 .90	-0.3221037	-9.3761337	-2.875424	-39802535
0.1 .00	-0.3112572	-8.4086465	-1.8477274	-360510351
0.1 .20	-0.2870226	-6.9529066	-1.2755006	-30462626
0.1 .40	-0.2599218	-5.9095752	-9.3132478	-26504801
0.1 .60	-0.2306326	-5.1925088	-7.05675484	-21264857
0.2 .00	-0.1998730	-4.5167231	-5.691430	-2.31264857
0.2 .20	-0.1683770	-4.0313485	-4.898475	-1.9428467
0.2 .40	-0.1060583	-3.3123315	-3.0997136	-1.6632703
0.2 .60	-0.0765845	-3.0416075	-2.6389845	-1.5526800
0.2 .80	-0.0490335	-2.8139063	-2.2769177	-1.4554319
0.3 .00	-0.0239046	-2.6209211	-1.9875252	-1.3685946
0.3 .50	.00259222	-2.2514832	-1.4750040	-1.1847395
0.4 .00	.00549340	-1.9924274	-1.1445322	-1.0349471
0.4 .50	.00637580	-1.808423	-0.9145472	-0.9108149
0.5 .00	.00563790	-1.6491954	-0.7440456	-0.8085935
0.7 .50	-.00215238	-1.1069350	-0.3078469	-0.5375478
1.0 .00	.00016601	-0.8104943	-0.1806031	-0.4143149
1.5 .00	.00011461	-0.5491578	-0.0802261	-0.2716295
2.0 .00	.00016245	-0.4087199	-0.0457290	-0.2054848

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 3.4$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-0.3091884	-4.21.891398	-9.390.6259	-43.270.8118
00.02	-0.3091676	-2.21.445421	-2.347.6330	-21.635623
00.03	-0.3091328	-1.14.296638	-1.043.3750	-14.423987
00.04	-0.3090842	-1.10.722154	-1.586.88474	-10.818240
00.05	-0.3089453	-1.14.74845	-2.60.82026	-7.2126362
00.06	-0.3089453	-1.14.74845	-2.60.82026	-7.2126362
00.08	-0.3087508	-5.3599647	-1.46.69771	-5.4099768
00.10	-0.3085009	-4.2873051	-9.3.875278	-4.3284951
00.15	-0.3076339	-2.8566216	-4.1.705019	-2.8868507
00.20	-0.3064224	-2.1408841	-2.3.445491	-2.1663615
00.25	-0.3048686	-1.7110553	-1.4.99405	-1.7343798
00.30	-0.3029752	-1.4.242056	-1.0.403146	-1.4466092
00.35	-0.3007458	-1.2190626	-7.6350772	-1.2412534
00.40	-0.2981845	-1.0649916	-5.8385700	-1.0874040
00.50	-0.2920852	-0.84879344	-3.7260885	-1.87340573
00.60	-0.2847219	-0.70413748	-2.5788448	-7.2948971
00.70	-0.2761479	-0.60039641	-1.8.873765	-6.2774183
00.80	-0.2664254	-0.5226139	-1.4.388728	-5.5170209
00.90	-0.2562245	-0.4612315	-1.3120653	-4.9277922
01.00	-0.2438228	-0.41220787	-0.9120320	-4.4581652
01.20	-0.2175604	-0.3829723	-0.6270843	-3.7573262
01.40	-0.1883799	-0.28526157	-0.45610403	-3.2596272
01.60	-0.1570935	-0.24547800	-0.34601076	-2.8875461
01.80	-0.1245556	-0.21471260	-0.27133526	-2.5977933
02.00	-0.0916344	-0.19041800	-0.21863674	-2.3651444
02.20	-0.0591827	-0.17095991	-0.18026658	-2.1726339
02.40	-0.0280107	-0.15523097	-0.15160392	-2.0096495
02.60	-0.0011396	-0.14244376	-0.12971812	-1.8688238
02.80	-0.0276166	-0.13201338	-0.11267465	-1.7450248
03.00	-0.0050877	-0.12348810	-0.09915381	-1.6346232
03.50	-0.00925309	-0.10829590	-0.07532061	-1.4019909
04.00	0.01089141	0.9875484	0.5968940	1.2146318
04.50	0.01021378	0.9210477	0.4824243	1.0618894
05.00	0.00782769	0.8652893	0.3913357	0.9386468
07.50	-0.00368124	-0.0631040	0.1398652	0.6304211
10.00	0.0048141	0.3965428	0.0924826	0.4860992
15.00	0.0012173	0.2774954	0.0402773	0.3169960
20.00	0.0026110	0.2034128	0.0237921	0.2399713

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 3.4$

Ω	\bar{C}_{Lh}	$* \bar{C}_{La}$	$* \bar{C}_{L\alpha}$
00 . 01	- 0 3 0 7 8 2 6 5	- 7 9 • 7 8 9 8 2 4	- 1 7 2 9 2 • 2 4 8
00 . 02	- 0 3 0 7 8 1 0 8	- 3 9 • 8 9 4 6 8 1	- 4 3 2 3 • 0 4 0 8
00 . 03	- 0 3 0 7 8 4 6	- 3 9 • 5 9 6 1 9 8	- 1 6 • 0 7 4 8 6 9
00 . 04	- 0 3 0 7 7 4 8 0	- 1 9 • 9 4 6 8 7 9	- 1 0 8 0 • 7 3 9 0
00 . 05	- 0 3 0 7 6 4 3 5	- 1 3 • 2 9 7 4 0 6	- 4 8 0 • 3 1 2 7 9
00 . 06	- 0 3 0 7 6 4 3 5	- 1 3 • 2 9 7 4 0 6	- 4 8 0 • 3 1 2 7 9
00 . 08	- 0 3 0 7 4 9 7 1	- 9 • 9 7 2 5 1 6 6	- 2 7 0 • 1 6 3 6 1
00 . 10	- 0 3 0 7 3 0 9 0	- 7 • 9 7 7 4 6 0 0	- 1 7 2 • 8 9 4 5 7
00 . 15	- 0 3 0 6 6 5 6 5	- 5 • 3 1 7 0 2 7 7	- 7 6 • 8 2 6 4 1 1 2
00 . 20	- 0 3 0 5 7 4 4 5	- 3 • 9 8 6 4 3 1 4	- 4 3 • 2 0 2 6 0 2
00 . 25	- 0 3 0 4 5 7 4 4	- 3 • 1 8 7 7 7 2 4	- 2 7 • 6 3 9 6 3 1
00 . 30	- 0 3 0 3 1 4 8 3	- 2 • 6 5 5 0 8 5 0	- 1 9 • 1 8 5 7 2 4
00 . 35	- 0 3 0 1 4 6 8 4	- 2 • 2 7 4 3 8 4 5	- 1 4 • 0 8 8 3 3 9
00 . 40	- 0 2 9 9 7 3 5 7	- 1 • 9 8 8 6 7 9 1	- 1 0 • 7 9 9 5 9 2
00 . 50	- 0 2 9 4 9 3 5 7	- 1 • 5 8 8 2 7 1 8	- 6 • 8 8 9 5 3 9 2
00 . 60	- 0 2 8 9 3 7 3 0	- 1 • 3 2 0 8 8 7 2	- 4 • 7 7 6 4 0 8 3
00 . 70	- 0 2 8 2 8 8 5 6	- 1 • 1 2 9 5 3 9 6	- 3 • 5 0 2 4 6 5 8
00 . 80	- 0 2 7 5 5 1 5 5	- 1 • 9 8 5 7 3 9 6 3	- 2 • 6 7 5 8 3 9 0
00 . 90	- 0 2 6 7 3 1 0 3	- 0 8 7 3 6 2 3 4	- 2 • 1 0 9 3 1 7 3
01 . 00	- 0 2 5 8 3 2 2 7	- 0 7 8 3 8 1 4 9 7	- 1 • 7 0 4 2 9 7 0
01 . 20	- 0 2 3 8 2 3 4 4	- 0 6 4 8 6 6 7 7 7	- 1 • 1 7 7 2 6 9 7
01 . 40	- 0 2 1 5 7 5 7 6	- 5 5 1 8 3 9 4 7	- 8 6 0 1 9 2 7 3
01 . 60	- 0 1 9 1 4 5 0 3	- 4 7 9 1 1 0 3 8	- 6 5 5 0 6 4 5 1
01 . 80	- 0 1 6 5 9 0 3 7	- 4 2 7 5 8 3 2 7	- 5 1 5 0 4 7 0 2
02 . 00	- 0 1 3 9 2 3 8	- 3 3 7 9 1 6 8 4	- 5 1 5 4 5 2 8 9
02 . 20	- 0 1 1 3 5 1 2 2	- 3 4 0 8 8 6 5 1	- 3 4 2 2 5 9 7 9
02 . 40	- 0 0 8 7 8 4 8 8	- 3 1 0 6 6 5 1 6	- 2 8 7 0 1 7 8 7
02 . 60	- 0 0 6 3 2 7 3 9	- 2 8 4 3 6 3 9	- 2 4 3 8 4 9 6
02 . 80	- 0 0 4 0 2 7 3 9	- 2 6 4 1 7 4 0 6	- 2 1 0 8 4 6 9 4
03 . 00	- 0 0 1 9 2 6 8 0	- 2 4 6 1 1 0 6 4	- 1 8 4 0 1 4 1 6
03 . 50	- 0 0 2 2 4 8 6 8	- 2 1 1 3 7 1 1 0	- 1 3 6 4 3 1 5 9
04 . 00	0 0 4 6 8 9 7 1	1 8 6 8 3 9 3 9	1 0 5 7 3 2 0 0
04 . 50	0 0 5 4 3 4 7 6	1 6 8 6 0 8 1 5	0 8 4 4 0 0 9 5
05 . 00	0 0 4 8 0 4 9 7	1 5 4 1 7 5 2 4	0 8 8 6 3 9 3 5
07 . 50	- 0 0 1 9 7 0 7 1	- 1 0 3 3 7 6 7 4	0 2 8 5 1 8 0 4
10 . 00	0 0 0 2 3 9 4 2	0 7 5 7 2 4 8 7	0 1 6 7 5 2 1 5
15 . 00	0 0 0 0 3 3 3 5	0 5 1 2 7 3 6 4	0 0 7 3 8 7 9 4
20 . 00	0 0 0 1 7 1 7 7	0 3 8 2 2 1 9 7	0 0 4 2 4 0 7 7

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 3.6$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-0.2565207	-3.9•894835	-8.646•1.124	-4.0•984769
00.02	-0.2565034	-1.9•947187	-2.161•5.089	-2.0•4.92560
00.03	-0.2564747	-1.3•297868	-9.60•65635	-1.3•661901
00.04	-0.2564344	-9•9731317	-5.40•35798	-1.0•246631
00.05	-0.2563194	-6•6482417	-2.40•1.486	-6.8314769
00.08	-0.2561584	-4•9856431	-1.35•0.727	-5.1240167
00.10	-0.2559515	-3•9879613	-8.6•435758	-4.0996339
00.15	-0.2552339	-2•6573625	-3.8•401706	-2.7340613
00.20	-0.2542310	-1•9916838	-2.1•589338	-2.0515641
00.25	-0.2529447	-1•5919763	-1.3•808401	-1.6422949
00.30	-0.2513773	-1•3252581	-9•5815052	-1.3696374
00.35	-0.2495317	-1•1345373	-7•0328812	-1.1750416
00.40	-0.2474111	-0.99131875	-5•3787884	-1.0292318
00.50	-0.2423611	-0.79039988	-3•4337476	-1.82541833
00.60	-0.2362636	-0.65601853	-2•3774088	-6.8988365
00.70	-0.2291626	-0.55968664	-1•7407016	-5.9334773
00.80	-0.2211090	-0.48716393	-1•3276879	-5.2116816
00.90	-0.2121602	-0.43054215	-1•447603	-4.6520830
01.00	-0.2023800	-0.38507876	-1•84261466	-4.2058459
01.20	-0.1806072	-0.31656962	-0.57991402	-3.5394516
01.40	-0.156403	-0.26743037	-4.2228181	-3.0658470
01.60	-0.1304273	-0.23056732	-3.2069381	-2.7116365
01.80	-0.1035926	-0.20204073	-2.5170445	-2.4360254
02.00	-0.0760127	-0.17948123	-2.0294558	-2.2145590
02.20	-0.0489936	-0.16137042	-1.6738017	-2.0317295
02.40	-0.0230076	-0.14668157	-1.4075900	-1.8772768
02.60	-0.0013273	-0.13468684	-1.2038854	-1.7441931
02.80	-0.0234656	-0.12484795	-1.04918720	-1.6275783
03.00	-0.0429506	-0.11675132	-0.91854608	-1.5239487
03.50	-0.0779784	-0.10212074	-0.6954608	-1.3068992
04.00	-0.0919100	-0.09272011	-0.5493486	-1.1333835
04.50	-0.0863313	-0.08608011	-0.4431069	-0.9925121
05.00	-0.0661787	-0.08057285	-0.3593809	-0.878614
07.50	-0.0332475	-0.05246665	-0.1302051	-0.5901917
10.00	-0.0058029	-0.03702074	-0.0861952	-0.4544985
15.00	-0.0001319	-0.02582826	-0.0367844	-0.2969287
20.00	-0.0027075	-0.01903575	-0.0221366	-0.2242294

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 3.6$

Ω	\bar{C}_{Lh}	C_{Lh}^*	\bar{C}_{La}	C_{La}^*
0.0 .01	- .02584068	- 74 .629005	- 16036 .356	- 31 .761898
0.0 .02	- -.02583936	- 37 .314309	- 4009 .0714	- 15 .881090
0.0 .03	- -.02583717	- 24 .875991	- 1781 .7965	- 10 .587551
0.0 .04	- -.02583410	- 18 .656767	- 1002 .2503	- 7 .9408276
0.0 .05	- -.02582534	- 12 .437414	- 445 .43154	- 5 .2941988
0.0 .06	- -.02582534	- 12 .437414	- 445 .43154	- 5 .2941988
0.0 .08	- -.02581308	- 9 .3276087	- 250 .54499	- 3 .9709784
0.0 .10	- -.02579732	- 7 .4616225	- 160 .34037	- 3 .1771212
0.0 .15	- -.02574265	- 4 .973414	- 71 .249405	- 2 .1886355
0.0 .20	- -.02566624	- 3 .7288817	- 40 .067606	- 1 .589676
0.0 .25	- -.02556820	- 2 .9819529	- 25 .634929	- 1 .2728150
0.0 .30	- -.02530795	- 2 .1277871	- 17 .795005	- 1 .0615324
0.0 .40	- -.02514615	- 1 .8606322	- 9 .997361	- 91074543
0.0 .50	- -.02476052	- 1 .48662627	- 6 .3918040	- 79776650
0.0 .60	- -.02429433	- 1 .2363080	- 4 .321086	- 63985678
0.0 .70	- -.02375057	- 1 .0574676	- 3 .2506472	- 46009448
0.0 .80	- -.02313274	- 92309400	- 2 .4840083	- 40420403
0.0 .90	- -.02244480	- 81838529	- 1 .958783	- 36088634
0.1 .00	- -.02169114	- 73446209	- 1 .5829149	- 32635706
0.1 .20	- -.02000610	- 60826006	- 1 .0940332	- 27482944
0.1 .40	- -.01811982	- 51786651	- 7983755	- 23825721
0.1 .60	- -.01607881	- 4497887	- 60944766	- 218975368
0.1 .80	- -.01393239	- 39720922	- 47943085	- 17276419
0.2 .00	- -.01173121	- 35512250	- 38689648	- 15877972
0.2 .20	- -.00952563	- 32089039	- 31884431	-
0.2 .40	- -.00736428	- 29261854	- 36744171	- 14700249
0.2 .60	- -.00529264	- 226898469	- 22773777	- 13688597
0.2 .80	- -.00335175	- 24903239	- 19647649	- 12804654
0.3 .00	- -.00157714	- 23204774	- 17144426	- 12021003
0.3 .50	- -.00195777	- 19925419	- 12700589	- 10383246
0.4 .00	- 00403137	- 17595737	- 9831971	- 09071767
0.4 .50	- 00466620	- 15857008	- 07841440	- 07997584
0.5 .00	- 00412488	- 14480074	- 6374893	- 07116856
0.7 .50	- 00179137	- 09701114	- 02659528	- 04735581
1.0 .00	- 00028183	- 07111172	- 01562782	- 03641268
1.5 .00	- 0002674	- 04810225	- 0685235	- 02393860
2.0 .00	- 00016194	- 03591861	- 00394918	- 01803175

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, M = 3.8

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-0.02153378	-37.314438	-8018.1684	-38.906456
00.02	-0.02153233	-18.657025	-2004.5261	-19.453574
00.03	-0.02152992	-12.437801	-890.88867	-12.969078
00.04	-0.02152655	-9.3281251	-501.11556	-9.7269782
00.06	-0.02151691	-6.2183196	-222.70620	-6.4849757
00.08	-0.02150343	-4.6632879	-125.26293	-4.8640713
00.10	-0.02148609	-3.7301660	-80.160626	-3.8916061
00.15	-0.02142597	-2.4857042	-35.615167	-2.5952111
00.20	-0.02134194	-1.8631548	-20.024299	-1.9472535
00.25	-0.02123417	-1.4893731	-12.80800	-1.558691
00.30	-0.02110283	-1.2399783	-8.8880832	-1.2997696
00.35	-0.02094818	-1.0616647	-6.5245475	-1.1149738
00.40	-0.0207049	-0.9277999	-4.9905734	-0.97649075
00.50	-0.02034729	-0.7399460	-3.1867628	-0.7828043
00.60	-0.01983626	-0.61443847	-2.2071029	-0.65409013
00.70	-0.01924105	-0.52446533	-1.6165910	-0.56232521
00.80	-0.01856588	-0.45675516	-1.2335200	-0.49368636
00.90	-0.01781555	-0.40391050	-0.97108123	-0.44045014
01.00	-0.01699534	-0.36149490	-0.78355185	-0.39798115
01.20	-0.01516875	-0.29760621	-0.53978524	-0.33452437
01.40	-0.01313689	-0.25179784	-0.39343941	-0.28939782
01.60	-0.01095545	-0.21743226	-0.29905443	-0.25563647
01.80	-0.00863831	-0.19082314	-0.2348931	-0.22936918
02.00	-0.00638004	-0.16975425	-0.18948884	-0.20827494
02.20	-0.00410511	-0.15280669	-0.15632041	-0.19088114
02.40	-0.00191487	-0.1302253	-0.1345133	-0.17621243
02.60	-0.00013865	-0.12772453	-0.11238748	-0.16360140
02.80	-0.00200933	-0.11841361	-0.09748422	-0.15257998
03.00	-0.00365833	-0.11070805	-0.08562063	-0.14281399
03.50	-0.00663243	-0.09662369	-0.06463901	-0.12246174
04.00	-0.0078263	-0.08740536	-0.05091477	-0.10629406
04.50	-0.00736129	-0.08082242	-0.0409545	-0.09321604
05.00	-0.00564397	-0.07540489	-0.0324452	-0.08266754
07.50	-0.00299055	-0.04914209	-0.01220509	-0.05550253
10.00	-0.00062910	-0.03475959	-0.00806658	-0.04268390
15.00	-0.00006521	-0.02415981	-0.00338847	-0.02794100
20.00	-0.00025200	-0.01790424	-0.00205953	-0.02104918

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 3.8$

Ω	\bar{C}_{Lh}	$\bar{C}_{L\alpha}$	\bar{C}_{La}	$* C_{La}$
0.01	-0.02191623	-70.133018	-14961.714	-30.391101
0.02	-0.02191512	-35.066345	-3740.4138	-15.195669
0.03	-0.02191326	-23.357381	-1662.3952	-10.130578
0.04	-0.02191067	-17.532844	-915.58400	-5.0656451
0.05	-0.02190325	-11.688197	-415.58400	-5.0656451
0.06	-0.02189287	-8.7657648	-233.75738	-3.7995106
0.07	-0.02183323	-4.67390179	-149.47694	-3.0398931
0.08	-0.02176853	-3.5044724	-66.47695	-2.0272533
0.09	-0.02168552	-2.8026004	-37.384706	-1.5211293
0.10	-0.02146514	-2.0000091	-23.919200	-1.2176103
0.15	-0.02132812	-1.7490057	-16.604640	-1.0153926
0.20	-0.02100155	-1.3973018	-12.194229	-0.8710593
0.25	-0.02060671	-1.1625143	-9.3517414	-0.76290401
0.30	-0.02158433	-2.3345092	-5.9655639	-0.61170503
0.35	-0.02146513	-2.0000091	-4.1371649	-0.51114070
0.40	-0.02014651	-1.9455306	-3.0348433	-0.4394998
0.45	-0.01962276	-0.86837552	-2.3195411	-0.38592595
0.50	-0.01903992	-0.77012095	-1.8292793	-0.34438577
0.55	-0.01840130	-0.69129443	-1.4787438	-0.31125880
0.60	-0.01697309	-0.57285954	-1.0225195	-0.26179282
0.70	-0.02014613	-0.9455306	-74.792206	-0.2665686
0.75	-0.01962276	-0.86837552	-57.016404	-0.20041050
0.80	-0.01364227	-0.42436367	-4.4872622	-0.18002939
0.85	-0.01182046	-0.37485535	-3.6225487	-0.16369941
0.90	-0.00995103	-0.33535713	-0.30521153	-0.15026849
0.92	-0.00807662	-0.27663954	-2.9862384	-0.15026849
0.94	-0.00623842	-0.25447509	-2.5052819	-0.13897245
0.96	-0.00447509	-0.23559829	-2.1335137	-0.12928715
0.98	-0.00282158	-0.21956498	-1.8405791	-0.12084382
0.99	-0.00130829	-0.18850374	-1.6058451	-0.11337801
0.995	-0.00171149	-0.18850374	-1.1887418	-0.09785025
0.999	-0.00348806	-0.16632350	-0.9193645	-0.08549807
1.00	-0.00403338	-0.14970795	-0.7326592	-0.07542809
1.005	-0.00356504	-0.13654416	-0.5954524	-0.06718710
1.009	-0.00162210	-0.09141815	-0.2493997	-0.0472110
1.01	-0.00030318	-0.06706939	-0.1465006	-0.03434270
1.015	-0.00006972	-0.04531652	-0.0639476	-0.02260534
1.020	-0.00014182	-0.03389388	-0.0369196	-0.01699867

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 4.0$

Ω	\bar{C}_{Mh}	C_{Mh}^*	$\bar{C}_{M\alpha}$	$C_{M\alpha}^*$
00.01	-0.01826343	-35.066454	-7480.8491	-37.014788
00.02	-0.01826220	-17.533063	-1870.1988	-18.507516
00.03	-0.01826016	-11.688526	-831.18955	-12.338480
00.04	-0.01825731	-8.7662027	-467.53629	-9.2540029
00.05	-0.01824915	-5.8437701	-207.78397	-6.169071
00.06	-0.0182205	-4.3824444	-116.887067	-4.6274906
00.08	-0.01822305	-3.5055617	-74.790798	-3.7022857
00.10	-0.0182214	-2.3361309	-33.230460	-2.4688685
00.15	-0.01817214	-1.7511454	-18.684376	-1.8523614
00.20	-0.01810099	-1.3999404	-11.951656	-1.4826170
00.25	-0.01800973	-1.3999404	-11.951656	-1.4826170
00.30	-0.01789852	-1.1656280	-8.2944167	-1.2362524
00.35	-0.01776756	-0.9811401	-6.0892588	-1.0603889
00.40	-0.01761709	-0.87235171	-4.6580698	-0.92858700
00.50	-0.01725869	-0.69599017	-2.9751114	-0.74428779
00.60	-0.01682587	-0.57810526	-2.0610694	-0.62165975
00.70	-0.01632169	-0.49365533	-1.5100922	-0.53426013
00.80	-0.01574972	-0.43012221	-1.1526496	-0.46886588
00.90	-0.01511397	-0.38055351	-0.90775054	-0.41812952
01.00	-0.01441890	-0.34077952	-0.73273650	-0.37764146
01.20	-0.01287055	-0.28089233	-0.50519036	-0.31711728
01.40	-0.01114742	-0.23796694	-0.36852315	-0.27405438
01.60	-0.00929645	-0.20576348	-0.28032463	-0.24182823
01.80	-0.00736725	-0.18081653	-0.22031774	-0.21663311
02.00	-0.00541044	-0.16104329	-0.17780779	-0.19663311
02.20	-0.00347608	-0.14511117	-0.14671403	-0.18005506
02.40	-0.00161205	-0.13212182	-0.12336703	-0.16609395
02.60	-0.0013738	-0.1214152	-0.10544278	-0.15411318
02.80	-0.00173288	-0.11260469	-0.09140951	-0.14366526
03.00	-0.00314115	-0.10525664	-0.08023360	-0.13442959
03.50	-0.00568815	-0.09169668	-0.06041457	-0.11526364
04.00	-0.00671865	-0.08268573	-0.04746982	-0.10012073
04.50	-0.00632664	-0.07619198	-0.03816185	-0.08791128
05.00	-0.00485144	-0.07087814	-0.03094291	-0.07806626
07.50	-0.00268551	-0.04623565	-0.01150406	-0.05239908
10.00	-0.00064510	-0.03279137	-0.00757682	-0.04024223
15.00	-0.00011997	-0.02270125	-0.00314489	-0.02639424
20.00	-0.00021843	-0.01691053	-0.00191824	-0.01983997

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 4.0$

Ω	\bar{C}_{Lh}	C_{Lh}^*	\bar{C}_{La}	C_{La}^*
0.01	-0.01507498	-61.054616	-12845.259	-27.355727
0.02	-0.01507422	-30.527195	-3211.3048	-13.677944
0.03	-0.01507294	-20.351338	-1427.2392	-9.187134
0.04	-0.01507116	-10.263731	-802.1620	-6.839134
0.05	-0.01506608	-0.175330	-356.79979	-4.559599
0.06	-0.01504160	-4.0691843	-200.69405	-3.4198871
0.07	-0.01504981	-3.0512323	-128.43940	-2.7361021
0.08	-0.01505896	-7.6312338	-57.076792	-1.8245130
0.09	-0.015041807	-4.0691843	-32.099904	-1.3688508
0.10	-0.01497371	-2.4403134	-20.539192	-1.0955587
0.15	-0.01491679	-0.147160	-57.076792	-1.8245130
0.20	-0.01491679	-3.0512323	-32.099904	-1.3688508
0.25	-0.01491679	-2.4403134	-20.539192	-1.0955587
0.30	-0.01484740	-2.0329126	-14.259325	-9.1345063
0.35	-0.01476567	-1.74418094	-10.472789	-7.8344689
0.40	-0.01467170	-1.52333937	-8.01522076	-6.8600740
0.50	-0.01444772	-1.2174057	-5.1251646	-5.4974051
0.60	-0.01417688	-1.0131945	-3.5553604	-4.5905497
0.70	-0.01386088	-0.86715306	-2.6089160	-3.9440889
0.80	-0.01350172	-0.75747945	-1.9947363	-3.4603038
0.90	-0.01310164	-0.67206279	-1.5737566	-3.0848979
1.00	-0.01266314	-0.60363761	-1.2727298	-2.7852870
1.20	-0.01168200	-0.50081263	-0.88086983	-2.3373967
1.40	-0.01058239	-0.42721791	-0.64492294	-2.0188174
1.60	-0.00939094	-0.37196511	-0.4920994	-1.7806081
1.80	-0.00813598	-0.32900678	-0.38761812	-1.5955656
2.00	-0.00684671	-0.29471340	-0.31314924	-1.4473703
2.20	-0.00555230	-0.26677206	-0.25828730	-1.3256520
2.40	-0.00428108	-0.24363596	-0.21676533	-1.2235225
2.60	-0.00305969	-0.22422819	-0.18462416	-1.1362452
2.80	-0.00191241	-0.2077273	-0.15926159	-1.0604743
3.00	-0.00086046	-0.19369330	-0.13809559	-0.9937959
3.50	-0.00124597	-0.16623698	-0.10267866	-0.8563563
4.00	-0.00249220	-0.14643183	-0.0925763	-0.7484027
4.50	-0.00287673	-0.13148491	-0.06306103	-0.6612076
5.00	-0.00254209	-0.11962894	-0.05121955	-0.5901288
7.50	-0.001255972	-0.07999632	-0.02164512	-0.3930240
10.00	-0.00030512	-0.05883120	-0.01268198	-0.3008766
15.00	-0.00012588	-0.03963788	-0.00549760	-0.1986208
20.00	-0.00007985	-0.02974759	-0.00316922	-0.1488468

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 4.5$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	$* C_{Ma}$
00.01	-0.1256241	-30.527270	-64.22.6243	-32.972232
00.02	-0.1256158	-15.263522	-16.05.6470	-16.486198
00.03	-0.1256018	-1.175556	-1.1670.6148	-1.0.990891
00.04	-0.1255822	-7.6315350	-40.1.402669	-8.2432645
00.05	-0.1255262	-5.0874389	-17.8.39448	-5.4956932
00.06	-0.1238846	-1.2192213	-10.264241	-1.3202573
00.08	-0.1254479	-3.8153156	-100.34162	-4.1219626
00.10	-0.1253473	-3.0519816	-64.214292	-3.297682
00.15	-0.1249982	-2.0340283	-28.533002	-2.1989700
00.20	-0.1245104	-1.5248658	-16.044574	-1.6497071
00.25	-0.1238846	-1.2192213	-10.264241	-1.3202573
00.30	-0.1231221	-1.0153374	-7.1243353	-1.1007130
00.35	-0.1222240	-0.86960414	-5.2310993	-0.94397087
00.40	-0.1211921	-0.76021693	-4.0023455	-0.82647893
00.50	-0.1157648	-0.60687219	-3.0557418	-0.66214123
00.60	-0.1157648	-0.50442841	-1.7726157	-0.55274375
00.70	-0.1123054	-0.43108438	-1.2995172	-0.47473246
00.80	-0.1083798	-0.37594131	-0.79256779	-0.41632924
00.90	-0.1040153	-0.33294580	-0.78223386	-0.37098976
01.00	-0.0992420	-0.29846697	-0.63189175	-0.33478670
01.20	-0.0886029	-0.24659153	-0.43634349	-0.28062338
01.40	-0.0767524	-0.20943314	-0.31879621	-0.24205034
01.60	-0.064096	-0.18155583	-0.24284433	-0.21316964
01.80	-0.0507124	-0.15994063	-0.19108480	-0.19070352
02.00	-0.0372066	-0.14277399	-0.15434154	-0.17268609
02.20	-0.0238350	-0.12889710	-0.12739964	-0.15786863
02.40	-0.0109272	-0.11753082	-0.10711417	-0.14542213
02.60	-0.0012108	-0.10812779	-0.09149488	-0.13477694
02.80	-0.00123053	-0.10028833	-0.07923108	-0.12553097
03.00	-0.0021227	-0.09371027	-0.06943052	-0.11739446
03.50	-0.00399739	-0.08135032	-0.05203024	-0.10064494
04.00	-0.0473049	-0.07290239	-0.04067935	-0.08755118
04.50	-0.0446430	-0.06670911	-0.03259859	-0.07706358
05.00	-0.0342427	-0.06168572	-0.02642590	-0.06861415
07.50	-0.00205512	-0.04034055	-0.01010374	-0.04601976
10.00	-0.00060963	-0.02880774	-0.00656912	-0.03522856
15.00	-0.00018786	-0.01975813	-0.00268004	-0.02320561
20.00	-0.00011978	-0.01487130	-0.00162218	-0.01736766

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, M = 4.5

Ω	\bar{C}_{Lh}	C_{Lh}^*	$\bar{C}_{L\alpha}$	$C_{L\alpha}^*$
0.0 .01	- .01082894	- 54 .145557	- 11280 .326	- 24 .816776
0.0 .02	- -.01082839	- 27 .072697	- 2820 .0744	- 12 .408445
0.0 .03	- -.01082748	- 18 .048375	- 1253 .036132	- 8 .2723601
0.0 .04	- -.01082621	- 13 .536186	- 705 .01151	- 6 .2043365
0.0 .05	- -.01082256	- 9 .0239438	- 313 .33319	- 4 .1363509
0.0 .06	- -.01082256	- 6 .7677685	- 176 .24578	- 3 .1023960
0.0 .08	- -.01081746	- 5 .4140201	- 112 .79389	- 2 .4820533
0.0 .10	- -.01081090	- 3 .6088968	- 50 .125376	- 1 .6550180
0.0 .12	- -.010808816	- 2 .7062014	- 28 .194170	- 1 .2415943
0.0 .15	- -.01075636	- 2 .1644781	- 18 .039133	- 1 .99361465
0.0 .20	- -.01075636	- 1 .5451422	- 9 .1991019	- 1 .71036748
0.0 .25	- -.01071556	- 1 .0802625	- 7 .0409170	- 1 .62191993
0.0 .30	- -.0106583	- 1 .3515040	- 4 .5029430	- 1 .498119932
0.0 .35	- -.01060725	- 1 .5927722	- 3 .1243582	- 1 .41583187
0.0 .40	- -.01053994	- 8 .9927722	-	
0.0 .50	- -.01037934	-		
0.0 .60	- -.01018516	-		
0.0 .70	- .00995858	- 76987519	- 2 .2931846	- 3 .5708985
0.0 .80	- .00970101	- 67272109	- 1 .7537914	- 3 .1310870
0.0 .90	- .00941404	- 59707398	- 1 .3840551	- 2 .7896311
0.1 .00	- .00909946	- 53649006	- 1 .1196550	- 2 .5169744
0.1 .20	- .00839530	- 44547899	- 77542786	- 21090765
0.1 .40	- .00760569	- 38036355	- 56810558	- 1 .81866791
0.1 .60	- .00674956	- 3348525	- 43376960	- 1 .614014
0.1 .80	- .00584713	- 29347947	- 34187767	- 1 .432571
0.2 .00	- .00491925	- 26312682	- 27633746	- 1 .2974075
0.2 .20	- .00398680	- 23837637	- 22801371	- 1 .1864854
0.2 .40	- .00307010	- 21785743	- 19140583	- 1 .0935568
0.2 .60	- .00218834	- 20061681	- 16303970	- 1 .0143143
0.2 .80	- .00135907	- 18596883	- 14063261	- 0 .9457074
0.3 .00	- .00059770	- 17340556	- 12263410	- 0 .8855272
0.3 .50	- .00093064	- 14878937	- 0 905490	- 0 .7622424
0.4 .00	.00183850	- 13090287	- 6979484	- 0 .6662692
0.4 .50	.00211969	- 11732988	- 0 5546514	- 0 .5892767
0.5 .00	.00188279	- 10655140	- 0 502876	- 0 .5267059
0.7 .50	- .00098283	- 0 7119586	- 0 1917120	- 0 .3509041
1.0 .00	.00027558	- 0 5248354	- 0 1119212	- 0 .2678891
1.5 .00	- .00014029	- 0 3527689	- 0 0483852	- 0 .1772601
2.0 .00	.00002784	- 0 2653507	- 0 0277524	- 0 .1325419

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 5.0$

Ω	\bar{C}_{Mh}	C_{Mh}^*	$\bar{C}_{M\alpha}$	$C_{M\alpha}^*$
00.01	-0.0902407	-27.072751	-5640.1593	-29.704923
00.02	-0.0902347	-13.536295	-1410.0334	-14.852520
00.03	-0.0902246	-9.0241061	-626.67674	-9.9017452
00.04	-0.0902106	-6.7679849	-352.50192	-7.4263772
00.05	-0.0901705	-4.5118095	-156.66276	-4.9510463
00.06	-0.089940	-1.0815670	-9.0157753	-1.1891670
00.08	-0.0901144	-3.3836678	-88.119058	-3.7134229
00.10	-0.0900423	-2.7067396	-56.393118	-2.9708787
00.15	-0.0897921	-1.8040434	-25.0588688	-1.9809105
00.20	-0.0894425	-1.3525617	-14.091898	-1.4860230
00.25	-0.088940	-1.0815670	-9.0157753	-1.1891670
00.30	-0.0884474	-9.0081707	-6.25833949	-9.9132608
00.35	-0.0878037	-7.7163677	-4.5958016	-8.5006446
00.40	-0.0870640	-6.7468881	-3.5167352	-7.4416412
00.50	-0.0853018	-5.3881596	-2.478103	-5.9601079
00.60	-0.0831731	-4.4808021	-1.55885930	-4.9735615
00.70	-0.0806925	-3.8314671	-1.430937	-4.2698067
00.80	-0.0778771	-3.3434934	-0.87349633	-3.7427381
00.90	-0.0747463	-2.9631909	-6.8873892	-3.3334017
01.00	-0.0713214	-2.6583542	-5.5665992	-3.0064199
01.20	-0.0636846	-2.1999616	-3.8481674	-2.5169534
01.40	-0.0551730	-1.8717766	-2.8145761	-21.681562
01.60	-0.0460137	-1.6255661	-2.1461554	-19.069120
01.80	-0.0364478	-1.4345425	-1.6901117	-17.037031
02.00	-0.0267223	-1.2826186	-1.3658988	-15.408239
02.20	-0.0170829	-1.1595245	-1.1277562	-14.070230
02.40	-0.0077662	-1.0583674	-0.9481000	-1.2948230
02.60	-0.0010071	-0.9743190	-0.8094835	-1.1990775
02.80	-0.00090388	-0.9038687	-0.7004247	-1.161440
03.00	-0.00161588	-0.8443776	-0.6131123	-1.0433873
03.50	-0.0291545	-0.7311908	-0.4578073	-0.8944571
04.00	-0.0345475	-0.6523351	-0.3566117	-0.7789241
04.50	-0.0326542	-0.5938356	-0.2850829	-0.6868493
05.00	-0.0250513	-0.5466115	-0.2310637	-0.6127311
07.50	-0.0158825	-0.3583244	-0.0904016	-0.4106554
10.00	-0.00053362	-0.2575205	-0.0579115	-0.3134721
15.00	-0.0020134	-0.1753139	-0.0234973	-0.2071658
20.00	-0.0003902	-0.1328377	-0.0139794	-0.1546276

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 5.0$

Ω	\bar{C}_{Lh}	$* C_{Lh}$	$\bar{C}_{L\alpha}$	$* C_{L\alpha}$
00 . 01	- . 00614895	- 44 . 273132	- 9107 . 6168	- 20 . 871655
00 . 02	- . 00614864	- 22 . 136520	- 2276 . 9002	- 10 . 435859
00 . 03	- . 00614812	- 14 . 757629	- 1011 . 9527	- 6 . 9572750
00 . 04	- . 00614740	- 11 . 068168	- 569 . 22108	- 5 . 2179934
00 . 05	- . 00614534	- 7 . 3786761	- 252 . 98420	- 3 . 4787330
00 . 06	- . 00614534	- 5 . 5338995	- 142 . 30130	- 2 . 6091240
00 . 08	- . 00614245	- 4 . 427091	- 91 . 070927	- 2 . 0873755
00 . 10	- . 00613874	- 2 . 9518039	- 40 . 473035	- 1 . 3917602
00 . 15	- . 00610786	- 2 . 2130453	- 22 . 763781	- 1 . 0440051
00 . 20	- . 00610786	- 1 . 7701620	- 14 . 566935	- 0.83539369
00 . 25	- . 00608476	- 1 . 056159	- 5 . 6870657	- 0.52263024
00 . 30	- . 00605661	- 1 . 4748568	- 10 . 114338	- 0.69635387
00 . 40	- . 00602343	- 1 . 2638826	- 7 . 4295717	- 0.59706886
00 . 50	- . 00598530	- 1 . 056159	- 3 . 6379074	- 0.41847510
00 . 60	- . 00589438	- 0.8395840	- 2 . 5248221	- 0.34910155
00 . 70	- . 00565605	- 0.6304978	- 1 . 8537055	- 0.29960044
00 . 80	- . 00551011	- 0.55108587	- 1 . 4181643	- 0.26251683
00 . 90	- . 00534748	- 0.48934232	- 1 . 195978	- 0.23370875
01 . 00	- . 00516915	- 0.43990969	- 0.90607404	- 0.21069079
01 . 20	- . 00476978	- 0.36568343	- 0.6203669	- 0.17622492
01 . 40	- . 00432162	- 0.3126289	- 0.46052075	- 0.15166043
01 . 60	- . 00383530	- 0.27276808	- 0.35192188	- 0.1326657
01 . 80	- . 00332218	- 0.24179088	- 0.271758360	- 0.11897009
02 . 00	- . 00279401	- 0.21703812	- 0.22451621	- 0.10752706
02 . 20	- . 00226258	- 0.19683298	- 0.18534707	- 0.09814644
02 . 40	- . 00173944	- 0.18005570	- 0.15563810	- 0.09030177
02 . 60	- . 00123549	- 0.16592873	- 0.13258716	- 0.08362983
02 . 80	- . 00076079	- 0.15389396	- 0.11435382	- 0.07787260
03 . 00	- . 00032420	- 0.14359325	- 0.09968854	- 0.07284240
03 . 50	. 00055500	- 0.12312389	- 0.07349995	- 0.06261652
04 . 00	. 00107299	- 0.0814692	- 0.05654246	- 0.05474714
04 . 50	. 00124342	- 0.09669834	- 0.04485953	- 0.04849131
05 . 00	. 00109834	- 0.08759016	- 0.03639515	- 0.04342917
07 . 50	- . 00061862	- 0.05847427	- 0.01566881	- 0.02894370
10 . 00	. 00020340	- 0.04327757	- 0.00908121	- 0.02200052
15 . 00	- . 00012452	- 0.02899509	- 0.00392772	- 0.01460264
20 . 00	- . 00002777	- 0.02185553	- 0.00223002	- 0.01089695

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 6.0$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-00512410	-22.01365521	-4553.8062	-24.771911
00.02	-00512376	-21.068229	-1138.4480	-12.385988
00.03	-00512319	-7.3787682	-505.97422	-8.2573617
00.04	-00512239	-5.5340224	-284.60840	-6.1930594
00.05	-00512012	-3.6892458	-126.48997	-4.1287790
00.06	-	-	-	-
00.08	-00511695	-2.7668269	-71.148514	-5.0966605
00.10	-00511286	-2.2133510	-45.5333530	-2.4774068
00.15	-00509870	-1.4753119	-20.2343389	-1.6517859
00.20	-00507891	-1.1062166	-11.379769	-1.2390293
00.25	-00505351	-0.8469936	-7.2813546	-1.99141810
00.30	-00502257	-0.7369719	-5.0550665	-8.2637921
00.35	-00498612	-0.6314069	-3.7126962	-7.0852407
00.40	-00494424	-0.5522041	-2.8414577	-6.2015834
00.50	-00484445	-0.44123215	-1.8169131	-4.9650619
00.60	-00472387	-0.36716334	-1.2604122	-4.1413528
00.70	-00458335	-0.314118747	-0.92490270	-3.55535044
00.80	-00442381	-0.27440018	-0.70718743	-3.1130363
00.90	-00424636	-0.24341075	-0.55796585	-2.7707894
01.00	-00405218	-0.21858523	-0.455127143	-2.4972650
01.20	-00361897	-0.18128174	-0.31240350	-2.0875435
01.40	-00313573	-0.154592332	-0.22881404	-1.7953485
01.60	-00261523	-0.13457040	-0.17469661	-1.5764039
01.80	-00207101	-0.11902401	-0.1371718	-1.4061068
02.20	-00151701	-0.10663722	-0.1113719	-1.2696975
02.50	-00096713	-0.09657088	-0.09199902	-1.1577921
02.40	-00043480	-0.08826299	-0.07732528	-1.0641474
02.60	-00006740	-0.08132136	-0.06598033	-0.9844574
02.80	-00052808	-0.07546242	-0.05703109	-0.9156650
03.00	-00093743	-0.07047455	-0.04984943	-0.8555482
03.50	-00168826	-0.06083357	-0.03704414	-0.7333786
04.00	-00200404	-0.05395520	-0.02871166	-0.6395607
04.50	-00189799	-0.04877545	-0.02287657	-0.5653064
05.00	-00145639	-0.04461288	-0.01853799	-0.5056185
07.50	-00098846	-0.02936089	-0.00750235	-0.3384488
10.00	-00038180	-0.02131889	-0.00467674	-0.2572239
15.00	-00017325	-0.01437536	-0.00190683	-0.1706858
20.00	-00004574	-0.01095572	-0.0010971	-0.1271124

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, M = 6.0

Ω	\bar{C}_{Lh}	$* \bar{C}_{Lh}$	$\bar{C}_{L\alpha}$	$* \bar{C}_{L\alpha}$
0.0 .01	-00382861	-37•520975	-7660•5331	-17•978823
00 .02	-00382842	-18•760459	-1915•1308	-8•9894311
00 .03	-00382810	-12•506941	-851•16743	-5•9929759
00 .04	-00382765	-9•3801720	-478•78025	-4•4947548
00 .05	-00382636	-6•2533842	-212•78941	-2•996468
00 .06	-00382457	-4•6899712	-119•69261	-2•2474559
00 .08	-00382226	-3•7519082	-76•602097	-1•7980118
00 .10	-00381426	-2•5011130	-34•043567	-1•1987834
00 .15	-00380307	-1•8756681	-19•149086	-0•9920163
00 .20	-00378872	-1•5003637	-12•253612	-71•947829
00 .25	-00377122	-1•2501299	-8•5084721	-59•68396
00 .30	-00375609	-1•0713653	-6•2502768	-51•13457
00 .35	-00372689	-9•3726943	-4•7846276	-44•98803
00 .40	-00367037	-74948279	-3•0610418	-36021925
00 .50	-00360200	-62423586	-2•1247962	-30041241
00 .60	-00352220	-53472879	-1•5602935	-25772498
00 .70	-00343145	-46756208	-1•1939337	-22573549
00 .80	-00333031	-41529186	-94278283	-20087623
00 .90	-00321938	-37345209	-76316011	-18100644
01 .00	-00297090	-31064409	-52924293	-15123954
01 .20	-00269193	-26574250	-38827954	-13001093
01 .40	-00238906	-2320583	-29686630	-11410784
01 .60	-00206930	-20584934	-23426579	-10174498
01 .80	-00173995	-18490602	-18955375	-9185122
02 .20	-00140832	-16779980	-15653053	-08374521
02 .40	-00108160	-15358214	-13146468	-07697329
02 .60	-00076659	-14159495	-11200075	-07122214
02 .80	-00046957	-13136648	-9659204	-06626882
03 .00	-00019612	-12254904	-8418875	-06195079
03 .50	-00035561	-10509885	-6201563	-05321191
04 .00	-00068610	-922243	-04764961	-0463295
04 .50	-00078930	-8233508	-3776482	-04125328
05 .00	-00069712	-7445880	-0362657	-03699298
07 .50	-00040893	-4968508	-1328501	-02465803
10 .00	-00014615	-3688026	-0765377	-01868576
15 .00	-00009738	-2466393	-32072	-01242356
20 .00	-00004368	-1859777	-187305	-00926790

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 7.0$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
0.0 · 0.1	- · 0.0319049	- · 18 · 760478	- · 3830 · 2652	- · 21 · 235854
0.0 · 0.2	- · 0.0319028	- · 9 · 3802103	- · 957 · 56409	- · 10 · 617947
0.0 · 0.3	- · 0.0318993	- · 6 · 2534416	- · 425 · 58240	- · 7 · 0786538
0.0 · 0.4	- · 0.0318943	- · 4 · 6900477	- · 239 · 881	- · 5 · 3090139
0.0 · 0.5	- · 0.0318802	- · 3 · 1266347	- · 106 · 39339	- · 3 · 5393874
0.0 · 0.6	- · 0.0318802	- · 2 · 3449091	- · 59 · 844992	- · 2 · 6545876
0.0 · 0.8	- · 0.0318605	- · 1 · 875851	- · 38 · 2997	- · 2 · 1237184
0.0 · 1.0	- · 0.0318351	- · 1 · 2504133	- · 17 · 020473	- · 1 · 4159240
0.0 · 1.5	- · 0.0317471	- · 9 · 3764350	- · 9 · 5727367	- · 1 · 0620601
0.0 · 2.0	- · 0.0316240	- · 74994425	- · 6 · 1255052	- · 84976807
0.0 · 2.5	- · 0.0314662	- · 62478069	- · 4 · 2529416	- · 70826178
0.0 · 3.0	- · 0.0312739	- · 53535225	- · 3 · 1238517	- · 60720423
0.0 · 3.5	- · 0.0310473	- · 46825872	- · 2 · 3910360	- · 53142686
0.0 · 4.0	- · 0.0307870	- · 374276618	- · 1 · 5292644	- · 42537547
0.0 · 5.0	- · 0.0301666	- · 31156663	- · 1 · 0611674	- · 35471393
0.0 · 6.0	- · 0.0294171	- · 26673072	- · 778894601	- · 30427319
0.0 · 7.0	- · 0.0285433	- · 23306923	- · 59580019	- · 26646845
0.0 · 8.0	- · 0.0275512	- · 20686076	- · 470266268	- · 23708572
0.0 · 9.0	- · 0.0264475	- · 18587275	- · 38049287	- · 21359642
0.0 · 10.0	- · 0.0252396	- · 1543490	- · 26362712	- · 17839741
0.1 · 20	- · 0.0225438	- · 13180583	- · 14765483	- · 13446150
0.1 · 40	- · 0.0195353	- · 11489446	- · 11647233	- · 11982150
0.1 · 60	- · 0.0162928	- · 10175724	- · 9423677	- · 10809904
0.1 · 80	- · 0.0129004	- · 09127861	- · 0784542	- · 09848963
0.2 · 00	- · 0.0094443	- · 08274762	- · 03119359	- · 06225501
0.2 · 20	- · 0.0060109	- · 07568873	- · 0542978	- · 09045773
0.2 · 40	- · 0.0026839	- · 06977083	- · 05580948	- · 08363359
0.2 · 60	- · 0.0004582	- · 06475526	- · 04820880	- · 07775421
0.2 · 80	- · 0.0033441	- · 06046477	- · 04210072	- · 07262795
0.3 · 00	- · 0.00059120	- · 05209438	- · 03119359	- · 06225501
0.3 · 50	- · 0.00106359	- · 04603968	- · 02410158	- · 05433839
0.4 · 00	- · 0.0126385	- · 04143991	- · 01916300	- · 04810001
0.4 · 50	- · 0.0119840	- · 03775048	- · 01552685	- · 04309066
0.5 · 00	- · 0.0091967	- · 02491574	- · 0642708	- · 02881786
0.7 · 50	- · 0.00064930	- · 01822434	- · 00392199	- · 02183512
1.0 · 00	- · 0.0027029	- · 01222710	- · 00161728	- · 01451948
1.5 · 00	- · 0.0013369	- · 00932540	- · 00091214	- · 01081079
2.0 · 00	- · 0.0006915	- · 000932540	- · 00091214	- · 01081079

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 7.0$

Ω	\bar{C}_{Lh}	C_{Lh}^*	\bar{C}_{La}	C_{La}^*
00.01	-0.00254620	-32.591856	-6621.8379	-15.778612
00.02	-0.00254607	-16.295909	-1655.4578	-7.8693189
00.03	-0.00254586	-10.863918	-735.75784	-5.2595604
00.04	-0.00254556	-8.1479163	-413.86284	-3.9446854
00.05	-0.00254471	-5.4319018	-183.93784	-2.6298191
00.06	-0.00254471	-	-	-
00.08	-0.00254351	-4.0738818	-103.46409	-1.9723946
00.10	-0.00254198	-3.0570597	-66.216241	-1.5779468
00.15	-0.00253667	-2.1726007	-29.428244	-1.0520365
00.20	-0.00252923	-1.6293397	-16.552448	-7.8910276
00.25	-0.00251970	-1.3033581	-10.592798	-63135956
00.30	-0.00250807	-1.0860166	-7.3554611	-5.2621145
00.35	-0.00249438	-0.93075524	-5.4034532	-4.5111754
00.40	-0.00247863	-0.81429431	-4.1365291	-3.9480737
00.50	-0.00244108	-0.54121412	-2.6466381	-31599717
00.60	-0.00239566	-0.54245684	-1.8373300	-26348283
00.70	-0.00234264	-0.46474315	-1.3493585	-22599359
00.80	-0.00232834	-0.40643363	-1.0326622	-19789391
01.00	-0.00221512	-0.36106218	-0.8155218	-17605280
01.20	-0.00197622	-0.32474930	-0.66027057	-15859158
01.40	-0.00179073	-0.27024774	-0.45803881	-13242477
01.60	-0.00158927	-0.20206509	-0.25709591	-1375638
01.80	-0.00137651	-0.17933490	-0.20294222	-0.8889107
02.00	-0.00115726	-0.16116255	-0.16424992	-0.8018783
02.20	-0.00093640	-0.14631364	-0.13566082	-0.7305970
02.40	-0.000718668	-0.13396450	-0.33615318	-0.9976729
02.60	-0.00050866	-0.12354393	-0.25709591	-0.6205882
02.80	-0.0003120750	-0.11464286	-0.20294222	-0.8889107
03.00	-0.000120750	-0.10696015	-0.07396297	-0.5393338
03.50	-0.00024086	-0.09171815	-0.05371414	-0.4630217
04.00	-0.00046221	-0.0842842	-0.04123780	-0.4049565
04.50	-0.00053148	-0.07173372	-0.03266044	-0.3592266
05.00	-0.00046936	-0.06480131	-0.02647977	-0.3223960
07.50	-0.00028249	-0.04322931	-0.01154649	-0.2149121
10.00	-0.00010615	-0.03215638	-0.00662174	-0.1625068
15.00	-0.00007421	-0.02148216	-0.00288284	-0.01081491
20.00	-0.00004383	-0.01619398	-0.00162027	-0.00807034

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 8.0$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-0.0212182	-1.6295922	-3310.9181	-18.580823
00.02	-0.0212168	-8.1479418	-827.72805	-9.2904244
00.03	-0.0212145	-4.4319407	-367.87805	-6.1936314
00.04	-0.0212122	-4.0739327	-206.93055	-4.6452391
00.05	-0.0212018	-2.7159127	-91.968051	-3.0968557
00.06	-0.0212018	-2.0368900	-51.731177	-2.3226728
00.08	-0.0211877	-1.6294663	-33.107253	-1.8581702
00.10	-0.0211718	-1.0862051	-14.713256	-1.2388540
00.15	-0.021134	-1.8145431	-8.2753615	-0.9291782
00.20	-0.0210316	-6.5152105	-5.2955400	-0.74345355
00.25	-0.0209268	-	-	-
00.30	-0.0207990	-5.4281925	-3.6768759	-6.1962506
00.35	-0.0206485	-4.6515788	-2.7008770	-5.3118827
00.40	-0.0204756	-4.0689708	-2.0674209	-4.6487112
00.50	-0.0206355	-3.2529764	-1.3224895	-3.7205151
00.60	-0.0195654	-2.7086173	-0.91785239	-3.1019781
00.70	-0.0189849	-2.319507	-0.67388645	-2.6603761
00.80	-0.0183256	-2.0274331	-0.51556076	-2.3293454
00.90	-0.0175922	-1.8000875	-0.40703081	-2.0720156
01.00	-0.0167893	-1.6180694	-0.32941743	-1.8662635
01.20	-0.0149972	-1.3447698	-0.22836287	-1.55786669
01.40	-0.0129965	-1.1493699	-0.16748864	-1.3377740
01.60	-0.0108394	-1.0027967	-0.12803413	-1.1727882
01.80	-0.0085816	-0.8889010	-0.10103513	-1.0444646
02.00	-0.0062803	-0.7979909	-0.08176863	-0.9417370
02.20	-0.003928	-0.07238916	-0.06755365	-0.85756664
02.40	-0.0017748	-0.6624765	-0.5677602	-0.7872654
02.60	-0.0003214	-0.6108763	-0.48441635	-0.7275952
02.80	-0.0002482	-0.5670271	-0.4180496	-0.6762498
03.00	-0.00039643	-0.5294008	-0.3648705	-0.6315462
03.50	-0.00071271	-0.4555579	-0.2698174	-0.5413387
04.00	-0.00084748	-0.4016755	-0.2080407	-0.4727703
04.50	-0.00080421	-0.3605103	-0.1651786	-0.4188961
05.00	-0.00061721	-0.3275233	-0.1338261	-0.3756687
07.50	-0.00044679	-0.2166157	-0.0562615	-0.2510735
10.00	-0.00019453	-0.1592726	-0.0378881	-0.1898278
15.00	-0.00010111	-0.1065718	-0.0140922	-0.1263680
20.00	-0.00006866	-0.0811917	-0.0078639	-0.0941400

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 8.0$

Ω	\bar{C}_{Lh}	C_{Lh}^*	\bar{C}_{La}	C_{La}^*
00.01	-000177938	-28 0 826374	-58 37 3411	-14 0 052868
00.02	-000177929	-14 0 413174	-14 59 3341	-7 0 02644229
00.03	-000177914	-9 0 6087676	-64 8 592111	-4 0 6843053
00.04	-000177893	-7 0 605602	-364 83241	-3 0 51323295
00.06	-000177834	-4 0 8043438	-162 14690	-2 0 3421798
00.08	-000177750	-3 0 6032267	-91 206974	-1 0 7566559
00.10	-000177643	-2 0 8825494	-58 371922	-1 0 4053464
00.15	-000177272	-1 0 9216257	-25 942244	-0 93694766
00.20	-000176753	-1 0 4411418	-14 591859	-0 70276322
00.25	-000176087	-1 0 1528341	-9 3382543	-0 5622640
00.30	-000175276	-0 96061454	-6 0 4844473	-0 6860829
00.35	-000174319	-0 82330274	-4 0 7636946	-0 40171934
00.40	-000173219	-0 72030846	-3 0 6468628	-0 3515976
00.50	-000170597	-0 57609208	-2 0 3334767	-0 281355310
00.60	-000167425	-0 47992186	-1 0 6200431	-0 2345661
00.70	-000163722	-0 41120792	-1 0 1898762	-0 20116231
00.80	-000159511	-0 35965551	-0 91069232	-0 17612110
00.90	-000154816	-0 31954548	-0 71929592	-0 15665449
01.00	-000149666	-0 28744645	-0 58240252	-0 14108933
01.20	-000138127	-0 23927534	-0 40411014	-0 11775902
01.40	-000125166	-0 20484926	-0 29664301	-0 10111000
01.60	-00011086	-0 17902238	-0 22692836	-0 08863175
01.80	-000096211	-0 15893614	-0 17916544	-0 07892938
02.00	-000080879	-0 14287535	-0 14503122	-0 07116595
02.20	-000065429	-0 12974822	-0 11980283	-0 06480898
02.40	-000050194	-0 11882638	-0 10063815	-0 05950375
02.60	-000035491	-0 10960489	-0 8574352	-0 05500502
02.80	-000021613	-0 10172234	-0 7394146	-0 05113800
03.00	-000008822	-0 09491288	-0 6443302	-0 04777495
03.50	-000017041	-0 08138062	-0 04741475	-0 04100117
04.00	-000032586	-0 07133110	-0 3638111	-0 03586269
04.50	-000037457	-0 06357567	-0 2879997	-0 03182623
05.00	-000033077	-0 05738801	-0 02334539	-0 02857967
07.50	-000020255	-0 03827759	-0 0102178	-0 01905219
10.00	-000007865	-0 02851743	-0 00583945	-0 01438375
15.00	-000005668	-0 01903906	-0 00255008	-0 00957788
20.00	-000003896	-0 01434527	-0 00143069	-0 00715080

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 9.0$

Ω	\bar{C}_{Mh}	C_{Mh}^*	$\bar{C}_{M\alpha}$	$C_{M\alpha}^*$
00.01	-0.0148281	-14.413183	-2918.6699	-16.515121
00.02	-0.0148271	-7.2065780	-729.6646	-8.2575700
00.03	-0.0148254	-4.8043705	-324.2945	-5.505570
00.04	-0.0148232	-3.6032623	-182.41560	-4.1288035
00.05	-0.0148166	-2.4021452	-81.072846	-2.7525563
00.06	-0.0148075	-1.8015778	-45.602883	-2.0644388
00.07	-0.0147957	-1.4412303	-129.185358	-1.6515733
00.08	-0.0147549	-0.96074627	-120.520	-1.1011002
00.09	-0.0146976	-0.72048233	-7.2953295	-8.2587899
00.10	-0.0146946	-0.57630660	-4.6685298	-6.6075836
00.11	-0.0143095	-4.8017516	-3.2416294	-5.5068793
00.12	-0.0143095	-41149780	-2.3812565	-47207464
00.13	-0.0140217	-35997946	-1.8228447	-4312193
00.14	-0.0136739	-28782979	-1.1661615	-33060513
00.15	-0.0136739	-23970465	-80945648	-27561204
00.16	-0.0132684	-20530936	-59438675	-23634590
00.17	-0.0128080	-17949680	-45481047	-20690817
00.18	-0.0122957	-15940763	-35912969	-18402182
00.19	-0.0117348	-14332639	-290129193	-16572051
00.20	-0.0104828	-11918543	-20159851	-13828469
01.0	-0.00090847	-1.0192884	-1.4791266	-1.1870095
01.1	-0.00090847	-0.8698470	-1.131690	-1.0401902
01.2	-0.0005982	-0.7892437	-0.8927962	-0.9259968
01.3	-0.00043886	-0.7089050	-0.7226796	-0.8345944
01.4	-0.00027881	-0.6433699	-0.5970917	-0.7597268
02.0	-0.00012355	-0.58899211	-0.5018091	-0.6972267
02.1	-0.00002326	-0.5432345	-0.4278513	-0.6442132
02.2	-0.00015828	-0.5042804	-0.3693199	-0.5986341
02.3	-0.00027860	-0.4707839	-0.3222104	-0.589897
03.0	-0.0005066	-0.4047805	-0.2379503	-0.4791419
04.0	-0.0059560	-0.3563338	-0.1832048	-0.4186170
04.5	-0.0056549	-0.3191800	-0.1453161	-0.3711604
05.0	-0.0043402	-0.2894231	-0.117277	-0.331036
07.0	-0.0031952	-0.1917071	-0.0500433	-0.225196
10.0	-0.0014332	-0.1414961	-0.0296953	-0.1679772
15.0	-0.0007687	-0.0945353	-0.0125074	-0.118908
20.0	-0.0006072	-0.0719052	-0.0069455	-0.0834151

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 90$

Ω	\bar{C}_{Lh}	\bar{C}_{Lh}^*	$\bar{C}_{L\alpha}$	$\bar{C}_{L\alpha}^*$
00.01	-00129256	-25.851587	-5222.5431	-12.664674
00.02	-00129249	-12.925784	-13.056350	-6.3323436
00.03	-00129239	-8.6171785	-15.8028160	-4.2315696
00.04	-00129223	-6.4628726	-32.640792	-3.1661849
00.05	-00129180	-4.3085602	-14.506958	-2.1108045
00.06	-00129180	-3.2313975	-81.601164	-1.5831186
00.08	-00129120	-2.5850948	-52.224353	-1.2665106
00.10	-00129042	-1.7233428	-23.210220	-0.84437665
00.15	-00128773	-1.2934509	-13.055276	-0.63332049
00.20	-00128396	-1.0339030	-8.3549887	-0.50669538
00.25	-00127912	-1.0339030	-8.3549887	-0.50669538
00.30	-00127323	-0.86152737	-5.8017484	-4.2228571
00.35	-00126629	-0.73839308	-4.2622272	-3.6199908
00.40	-00126530	-0.64603478	-3.2630208	-3.1678928
00.50	-00123927	-0.51671546	-2.0879599	-2.5350768
00.60	-00121624	-0.43048370	-1.4496630	-2.1133296
00.70	-00118935	-0.36887438	-1.047980	-1.8121875
00.80	-00115877	-0.32265508	-0.81501386	-1.5864180
00.90	-00112468	-0.28669676	-0.64377072	-1.4108911
01.00	-00108728	-0.25792210	-0.52128951	-1.2705285
01.20	-00100348	-0.21474370	-0.36176327	-1.0601110
01.40	-00090933	-0.18388878	-0.26560107	-0.9099251
01.60	-00080705	-0.16074224	-0.20321392	-0.793475
01.80	-00069897	-0.14274032	-0.16046557	-0.7098086
02.00	-00058755	-0.12834472	-0.12990990	-0.6397665
02.20	-00047524	-0.11657631	-0.10732178	-0.5824226
02.40	-00036446	-0.106678196	-0.9015877	-0.5345800
02.60	-00025752	-0.09850902	-0.7681641	-0.4940275
02.80	-00015655	-0.09143362	-0.6624156	-0.4591888
03.00	-00006346	-0.08531768	-0.5771963	-0.4289109
03.50	-0.00012488	-0.07314892	-0.4246175	-0.3680089
04.00	000023819	0.06409507	0.03256745	0.3219097
04.50	000027374	0.05709773	0.02577195	0.2857644
05.00	000024172	0.05151221	0.02088797	0.2567209
07.50	-0.00014983	-0.03435469	-0.00916769	-0.01711426
10.00	00005952	0.02562473	0.00522524	0.1290556
15.00	00004379	0.01710097	0.00228775	0.0859658
20.00	-0.0003312	-0.01287832	-0.00128249	-0.00642150

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 10.0$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
0.0 .01	-0.0107713	-1.2 .925790	-2.611.2711	-1.4 .862495
0.0 .02	-0.0107706	-6 .46288755	-6.52.81704	-7 .4312541
0.0 .03	-0.0107694	-4 .3085796	-2.90.814036	-4 .9541769
0.0 .04	-0.0107677	-3 .2314234	-1.63.20352	-3 .756405
0.0 .05	-0.0107630	-2 .1542607	-7.2.534354	-2 .4771086
0.0 .06	-0.0107630			
0.0 .08	-0.0107563	-1 .6156729	-4.0 .800145	-1 .8578471
0.0 .10	-0.0107478	-1 .2925151	-2.6 .111740	-1 .4862938
0.0 .15	-0.0107181	-8 .6162306	-1.1 .604675	-9.089971
0.0 .20	-0.0106767	-6 .4616109	-6 .5272036	-7.4321375
0.0 .25	-0.0106235	-5 .1687129	-4 .1770620	-5.9461095
0.0 .30	-0.0105588	-4 .3066771	-2 .9004440	-4 .9554965
0.0 .35	-0.0104825	-3 .6908498	-2 .3068660	-4 .2479769
0.0 .40	-0.0103948	-3 .289043	-1 .630857	-3 .7173898
0.0 .50	-0.0101858	-2 .5820063	-1 .0435624	-2 .9746909
0.0 .60	-0.0099333	-2.1505567	-7.2442244	-2 .4796895
0.0 .70	-0.0096389	-1 .8422317	-5.3199991	-21.262231
0.0 .80	-0.0093046	-1.6106710	-4.0711917	-18.612093
0.0 .90	-0.0089325	-1.4308312	-3.2151020	-16.551575
0.1 .00	-0.0085253	-1.2867273	-2.6028340	-14.903724
0.1 .20	-0.0076159	-1.0704325	-1.8055115	-12.433116
0.1 .40	-0.0066004	-0.9158410	-1.3250459	-10.669360
0.1 .60	-0.0055049	-0.7998849	-1.0134837	-9.346970
0.1 .80	-0.0043578	-0.7097498	-0.8001342	-8.318441
0.2 .20	-0.0020241	-0.6377460	-0.6477576	-7.495275
0.2 .50	-0.00036503	-0.5789765	-0.5352184	-6.821168
0.2 .60	-0.0001731	-0.5301717	-0.4497953	-6.258613
0.2 .80	-0.00011559	-0.4890617	-0.3834571	-5.781672
0.3 .00	-0.00020319	-0.4540179	-0.3309301	-5.371857
0.3 .50	-0.00036503	-0.4238385	-0.2886344	-5.015651
0.4 .00	-0.00043439	-0.3202440	-0.1637838	-3.757177
0.4 .50	-0.00041259	-0.2864418	-0.1298185	-3.332836
0.5 .00	-0.00031667	-0.2593778	-0.1051685	-2.992688
0.7 .50	-0.00023593	-0.1720006	-0.0450685	-1.998460
10 .00	-0.00010804	-0.1273119	-0.0265003	-1.506869
15 .00	-0.00005919	-0.0849848	-0.0112525	-1.004089
20 .00	-0.00005147	-0.0645347	-0.0062371	-0.0749091

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 10.0$

Ω	\bar{C}_{Lh}	$\bar{C}_{L\alpha}^*$	\bar{C}_{La}^*
0.0 .01	-0.00096857	-23.439780	-47.227.0224
0.0 .02	-0.00096853	-11.719883	-11.81.7550
0.0 .03	-0.00096844	-7.8132470	-5.25.22399
0.0 .04	-0.00096833	-5.8159268	-3.84115300
0.0 .05	-0.00096800	-3.9066017	-2.53.9207797
0.0 .06	-0.00096800	-1.90.66017	-1.981.1532
0.0 .08	-0.00096755	-2.3439343	-7.3.858923
0.0 .10	-0.00096697	-1.5625798	-47.269418
0.0 .12	-0.00096495	-1.1718927	-21.008179
0.0 .15	-0.00096495	-1.93747094	-11.816747
0.0 .20	-0.00096213	-1.39038117	-7.5624280
0.0 .25	-0.00095851	-1.39038117	-1.3122815
0.0 .30	-0.00095409	-7.8118196	-5.2514416
0.0 .35	-0.00094889	-6.6954056	-3.8579912
0.0 .40	-0.00094291	-5.8580348	-2.9535899
0.0 .50	-0.00092865	-4.6855858	-1.8900183
0.0 .60	-0.00091140	-3.9038117	-1.3122815
0.0 .70	-0.00089126	-3.3452876	-9.6393037
0.0 .80	-0.00086835	-2.9263023	-7.3784309
0.0 .90	-0.00084281	-2.6003499	-5.8284441
0.1 .00	-0.00081480	-2.3595281	-4.7198075
0.1 .20	-0.00075201	-1.9481723	-3.2758243
0.1 .40	-0.00068147	-1.6685332	-2.4053505
0.1 .60	-0.00060482	-1.4587637	-1.8405726
0.1 .80	-0.00052381	-1.2956166	-1.4535428
0.2 .00	-0.00044029	-1.1651433	-1.1768670
0.2 .20	-0.00035609	-1.0584658	-0.9723051
0.2 .40	-0.00027302	-0.9696627	-0.8168470
0.2 .60	-0.00019281	-0.8946309	-0.6959726
0.2 .80	-0.0001706	-0.8304358	-0.601516
0.3 .00	-0.00004721	-0.7749205	-0.5229180
0.3 .50	-0.00009418	-0.6643639	-0.3846011
0.4 .00	-0.00017931	-0.5819932	-0.2948932
0.4 .50	-0.00020604	-0.5182627	-0.2332998
0.5 .00	-0.00018193	-0.4673721	-0.1890682
0.7 .50	-0.00011379	-0.3116774	-0.0831551
1.0 .00	-0.0004595	-0.2326841	-0.0472997
1.5 .00	-0.0003431	-0.1552437	-0.0207519
2.0 .00	-0.0002771	-0.1168540	-0.0116301

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 11.0$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-000080714	-1.1.719887	-2363.5109	-13.510435
00.02	-000080708	-5.8599365	-590.87717	-6.7552224
00.03	-000080700	-3.9066163	-262.61167	-4.5034872
00.04	-000080687	-2.9299537	-147.71874	-3.3776212
00.05	-000080652	-1.9532863	-65.652366	-2.2517586
00.06	-000080652	-1.9532863	-65.652366	-2.2517586
00.08	-000080602	-1.4649478	-36.929135	-1.6888307
00.10	-000080538	-1.1719408	-23.634383	-1.3510766
00.12	-000080316	-0.78125367	-10.503764	-0.90074553
00.15	-000080055	-0.5889813	-5.9080489	-0.67558828
00.20	-000079607	-0.46867536	-3.7808909	-0.54050049
00.25	-000079607	-0.46867536	-3.7808909	-0.54050049
00.30	-00079122	-39051906	-2.6253993	-4.5044737
00.35	-00078551	-393468659	-1.9286760	-3.8612828
00.40	-0007894	-39280660	-1.4764776	-3.3789290
00.50	-00076329	-23416157	-0.94469705	-2.7037257
00.60	-00074437	-19505106	-0.65583503	-2.253682
00.70	-00072232	-16710399	-0.48166691	-1.9323121
00.80	-00069727	-14613492	-0.36863173	-1.6913444
00.90	-00066940	-12981870	-0.29114181	-1.5039774
01.00	-00063889	-11676032	-0.23572030	-1.35441260
01.20	-00057076	-0.9716233	-0.16354421	-1.1294363
01.40	-00049466	-0.8315661	-0.12004634	-0.9690159
01.60	-00041256	-0.7265136	-0.09183537	-0.8487325
01.80	-00032658	-0.6448457	-0.07251321	-0.7551786
02.00	-00023887	-0.5795894	-0.05870946	-0.6803099
02.20	-00015161	-0.5263048	-0.04851139	-0.6190084
02.40	-00006692	-0.4820282	-0.04076781	-0.5678639
02.60	-0001321	-0.4447030	-0.03475204	-0.5245181
02.80	-00008695	-0.4128551	-0.02998698	-0.4872892
03.00	-00015271	-0.3853976	-0.02614880	-0.4549467
03.50	-00027428	-0.3310244	-0.01927813	-0.3899575
04.00	-00032648	-0.2908245	-0.01481574	-0.3408672
04.50	-00031017	-0.2598498	-0.01173698	-0.3024764
05.00	-00023808	-0.2350547	-0.00950811	-0.271728
07.50	-00017894	-0.1560064	-0.00409951	-0.1813952
10.00	-00008318	-0.1157230	-0.00239358	-0.1366546
15.00	-00004627	-0.0772087	-0.00102309	-0.0910776
20.00	-0004297	-0.0585418	-0.00056692	-0.0679917

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Moment, $M = 11.0$

Ω	\bar{C}_{Lh}	$* C_{Lh}$	\bar{C}_{La}	$* C_{La}$
00 . 01	- . 000 074456	- 21 . 443638	- 4318 . 7189	- 10 . 571868
00 . 02	- . 000 074452	- 10 . 721814	- 1079 . 6793	- 15 . 2859378
00 . 03	- . 000 074446	- 7 . 1478695	- 479 . 85710	- 3 . 5239627
00 . 04	- . 000 074437	- 5 . 3608956	- 269 . 91934	- 2 . 6429764
00 . 05	- . 000 074412	- 3 . 5739180	- 119 . 96381	- 1 . 7619926
00 . 06	- . 000 074412	-	-	-
00 . 08	- . 000 074378	- 2 . 6804255	- 67 . 479367	- 1 . 3215032
00 . 10	- . 000 074333	- 2 . 1443270	- 43 . 186570	- 1 . 0572116
00 . 15	- . 000 074178	- 1 . 4295204	- 19 . 793685	- 70482853
00 . 20	- . 000 073961	- 1 . 0721079	- 10 . 796176	- 5286433693
00 . 25	- . 000 073683	- 8 . 5765310	- 6 . 9093303	- 42293693
00 . 30	- . 000 073343	- 714 . 67722	- 4 . 7979583	- 35247015
00 . 35	- . 000 072944	- 612 . 54652	- 3 . 5248688	- 30214017
00 . 40	- . 000 072484	- 53594412	- 2 . 6985660	- 26439565
00 . 50	- . 000 071388	- 42869057	- 1 . 7268807	- 21156028
00 . 60	- . 000 070063	- 35717732	- 1 . 1990453	- 1763417
00 . 70	- . 000 068515	- 30608767	- 8 . 8078169	- 15119588
00 . 80	- . 000 066754	- 26776332	- 67422100	- 13233966
00 . 90	- . 000 064791	- 23794976	- 523260828	- 11767783
01 . 00	- . 000 062638	- 21409429	- 43131813	- 10595175
01 . 20	- . 000 057812	- 17830161	- 299938679	- 08836989
01 . 40	- . 000 052390	- 15272778	- 21985191	- 07581787
01 . 60	- . 000 046497	- 13354431	- 16824552	- 06640743
01 . 80	- . 000 04269	- 11862435	- 13287818	- 05908943
02 . 00	- . 000 03847	- 10669180	- 10759274	- 05323441
02 . 20	- . 000 027372	- 09693443	- 8889566	- 04844184
02 . 40	- . 000 020982	- 08881058	- 7468483	- 0444482
02 . 60	- . 000 014812	- 08194497	- 6363380	- 04105870
02 . 80	- . 000 008984	- 07606920	- 5487199	- 03815174
03 . 00	- . 000 003609	- 07098615	- 47808679	- 03562753
03 . 50	- . 000 007275	- 06085655	- 351568	- 03055917
04 . 00	. 000 13832	05330147	2695032	02673354
04 . 50	. 000 15892	04745121	2131701	02374125
05 . 00	. 000 14032	0427829	1727412	0213403
07 . 50	- . 000 08836	02852607	0760969	01423657
15 . 00	- . 000 03612	02131109	00432116	01071104
20 . 00	- . 000 02308	01421593	00189926	00713747
		01069596	00106440	00533637

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Continued), Lift, $M = 12.0$

Ω	\bar{C}_{Mh}	C_{Mh}^*	\bar{C}_{Ma}	C_{Ma}^*
00.01	-0.0062046	-1.0	7.21817	-2159.3592
00.02	-0.0062042	-5.0	3.609031	-539.83938
00.03	-0.0062035	-3.5739292	-239.92830	-4.1279505
00.04	-0.0062026	-2.6804404	-134.95942	-3.0959673
00.05	-0.0061998	-2.1786947	-159.981652	-2.0639868
00.06	-0.0061993	-1.	7.869478	-12.383831
00.08	-0.0061960	-1.	3.401979	-1.5479991
00.10	-0.0061911	-1.	0.7214449	-1.2384085
00.15	-0.0061740	-7.1473235	-9.5965598	-8.2562700
00.20	-0.0061502	-5.3601689	-5.3978394	-6.1924260
00.25	-0.0061196	-4.2878034	-3.4544172	-4.9541700
00.30	-0.0060823	-3.5728333	-2.3987325	-4.1287075
00.35	-0.0060384	-3.0620900	-1.7621892	-3.5391265
00.40	-0.0059879	-2.6789893	-1.3490495	-3.0969709
00.50	-0.0058676	-2.1442547	-1.86320092	-2.4780237
00.60	-0.0057223	-1.7848140	-1.59928809	-2.0654675
00.70	-0.0055528	-1.15292053	-1.44016201	-1.7708453
00.80	-0.0053603	-1.3374314	-1.33688815	-1.5499281
00.90	-0.0051461	-1.1882205	-2.6608902	-1.3781437
01.00	-0.0049116	-1.0688102	-2.1545186	-1.2407486
01.20	-0.0043879	-0.88996145	-1.4950390	-1.0347231
01.40	-0.0038029	-0.7615626	-1.0975626	-0.8876175
01.60	-0.0031718	-0.6655161	-0.8397450	-0.773129
01.80	-0.0025107	-0.5908436	-0.631334	-0.6915203
02.00	-0.00218362	-0.5311656	-0.5369368	-0.6226666
02.20	-0.00211651	-0.4824202	-0.436818	-0.5666607
02.40	-0.0005136	-0.4418969	-0.3728527	-0.5197765
02.60	-0.0001029	-0.4077153	-0.3178123	-0.4800518
02.80	-0.0006703	-0.3785284	-0.2742023	-0.459441
03.00	-0.0011766	-0.3533440	-0.2390673	-0.4163246
03.50	-0.0021128	-0.3033924	-0.1761549	-0.3568519
04.00	-0.0025154	-0.2663758	-0.1352989	-0.3119793
04.50	-0.0023903	-0.2378108	-0.1071393	-0.2769171
05.00	-0.0018347	-0.2149478	-0.0867917	-0.2488277
07.50	-0.0013881	-0.1427576	-0.0375976	-0.1660819
10.00	-0.0006526	-0.1060733	-0.0218308	-0.1250330
15.00	-0.0003671	-0.0707479	-0.0093815	-0.0833426
20.00	-0.0003575	-0.0535726	-0.0052010	-0.0622525

Table 1208.2 AERODYNAMIC FLUTTER COEFFICIENTS (Concluded), Moment, $M = 12.0$

SECTION 12 - AEROELASTIC PHENOMENAREFERENCES

(Note: In this list APL/JHU designates the Applied Physics Laboratory of The Johns Hopkins University, and NACA designates the National Advisory Committee for Aeronautics.)

<u>Ref. No.</u>	<u>Title</u>
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